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— THE —

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INDEX.

EDITORIAL.

Accidents in Shipyards, 69
Channel Tunnel, 104
City Company of Marine Engineers, 146
Condenser Tubes, Corrosion of, 103
Contraband of War, 1
Corrosion of Condenser Tubes, 103
Declaration of London, 1
Diesel Engine Explosions, 145
Explosions in Diesel Engines, 145
High Power Diesel Engines, 415
International Conference on Safety of Life at Sea, 287 (see also General Index)
Marine Engineer, The, 455
Merchant Shipping (Convention) Bill, 455
Naval Discipline, 375
Naval Estimates, 331
Naval Policy, 1, 456
Oil Fuel for the Navy, 1, 456
Police Duty on Naval Ships, 375
Review of the Year (1913), 183
Royal Naval Reserve, 146 (see also General Index)
Safety of Life at Sea, International Conference on, 287, 455
Sea Training, 183
Shipyard Accidents, 69
Sight Tests, 2, 35
Superheaters in the Mercantile Marine, 376
Thames Engineering, 375
Thames Iron Works, 375
Triple Expansion Engines *versus* Turbines, 35
Turbines *versus* Triple-Expansion Engines, 35
Unsinkable Passenger Ships, 251, 285

GENERAL INDEX.

Abell, Prof. W. S. (Lloyd's) (Illus.), 271
Accidents (Losses, Strandings, Collisions, etc.), see Mail Lines. "Mount Oswald," 38; "Tripolitania," (Illus.), 44, 70, 143; "Llandudno," 78; "Volturno," 118, 155, 256; "Balmes," 155; "Templemore," 155; "Manchester Commerce," 155; "Acilia," 196; "Indrabarah," 197; "Scotsdyke," 173, 197; "Twingone" (Illus.), 197, 337; "Oklahoma," 253, 338, 418; "Cobequid," 256; "Monroe," 290; S. Yacht "Warrior," 290; "Dover Castle," 337; Newfoundland Sealing Fleet, 388; "Columbian," 418; Pilot Steamer "W. W. Jones" (Bristol Notes, 446); "Empress of Ireland," 457, 500; "Waipara," 458; "Oriole," 458; "Buelow," 458; "Kaiser Wilhelm II.," 458; "Incemore," 458, 487, 493; "New York"—"Pretoria," 459
Advent of the Big Ship (Mail Lines), 336
Aero and Marine Motor Exhibition, 344
Allan Line (Mail Lines), 2, 73, 197
Alternative Systems of Machinery, 350
Ambrose Channel (Mail Lines), 74
Anchor Line, The Story of the (Illus.), 10
Anglo-American Exhibition, 475
Anti-Rolling Tanks on the "Imperator" (Illus.), 51
Appointments, New, 121
"Aquitania," Cunard Co.'s, 282, 381, 436. Motor Boats (Illus.), 427. Illus. description, 462
"Ardent" T.B.D., 384
Armed Merchantmen (Mail Lines), 4, 388; (Humber Notes), 317
Astern Turbine combined with Low-pressure Turbine (Illus.), 351
Atlantic Liners, New (Dimensions), Mail Lines, 389; Comparative Table, 462
Atlantic Rate War (Mail Lines), 289
Auld's Valves (Illus.), 305
Australian Services (Mail Lines), 290

Babcock & Wilcox Marine Boiler (Illus.), 207
Beardmore Naval Work (H.M.S. "Galatea"), 432
Beardmore, Sir Wm., Bart. (Illus.), 355
Belgian State Railway (Mail Lines), 2
Berry, Edwin (Illus.), 20
Biographies (Illus.), Edwin Berry, 20; Eng. Capt. Wm. Onyon, R.N., 21; Capt. Jas. Smith, B.I.S.N. Co., 121; T. J. Dodd, 166; Francis Somerscales, 184; Prof. W. S. Abell, 271; Charles Buchanan, 271; Sir Wm. Beardmore, Bart., 355; Thomas L. Devitt, 394; John Sherratt, 479; John Sawyer, 317
"Bismarck," Hamburg-American Co. (Illus.), 475
Bladeless Turbine, 354
Board of Trade Enquiries, "Mount Oswald," 38. Also see "Accidents"
Board of Trade Examinations, see separate section of index
Board of Trade New Regulations for Engineers' Certificates, 455; and Correspondence, 55, 87, 123, 166, 189, 268, 327, 428, 481
Board of Trade 2nd Class Certificates, 88
Boat Gear (Colegrave's) Illus., 16; (Greenfield's), 20; (Scott's), 49; (Welin Davit Co.), 84
Boiler Explosions (Board of Trade enquiries), 52, 265, 310
Boilers, Modern Marine (Illus.), 205
Boilers on a Tramp Steamer, Upkeep and Management, 215
Boiler Water Circulator (Illus.), 491
Book Reviews, see separate section of Index
Bost, W. D. Ashton. Wood Charcoal, 311
Breakdowns at Sea, 328, 334
Brigham & Cowan's New Oil Burner, 144
"Britannic," White Star. The Launch (Illus.), 301. Engines (Illus.), 344, 376
British Corporation, Staff Dinner, 311. Annual Meeting, 341
British India Steam Navigation Co. (Mail Lines), 118
British India Steam Navigation Co., Engineer Officers' Dinner (Illus.), 339
British Vessels Launched and Engined (1913), 217, 284
Buchanan, Charles (Lloyd's), Illus., 271
Bulkheads, 77
Bullivant & Co. (Colegrave's Boat Gear), Illus., 16
Burners for Oil Fuel, 144, 259, 260, 261
Bursting of a CO_2 Cylinder (Illus.), 190

"Cairnross" and "Cairngowan." Comparative trials with different systems of propulsion, 350
Calorifiers, Low's (Illus.), 431
Calten's Telegraphs and Indicators (Illus.), 122
Canadian Pacific Railway and Austrian Government (Mail Lines), 195; C.P.R. Steamers, 417
"Castolin" Welding Process, 387
Chatham Dockyard, 5, 42, 74, 115, 157, 187, 264, 292, 333, 377, 430, 460
Circulator for Boilers (Illus.), 491
Clyde's First Submarine, 416
Clyde Shipbuilder on Lost Time, 146
CO_2 Cylinder, Bursting of a (Illus.), 190
Cold Storage and Ice Association, 170
Colegrave's Boat Lowering Gear (Illus.), 16, 130
Colonial Notes, see separate section of Index
Combined Low-pressure and Astern Turbine (Illus.), 351
Combustion of Oil Fuel in Marine Boilers, 202, 259, 296
Compagnie General Transatlantique (Mail Lines), 156
Condenser Tubes, Corrosion of, 52, 103, 150
Comparative Table of Size of Atlantic Liners, 462
Comparison of Alternative Systems of Propelling Machinery, 350
Construction of Ships, Safety of Life at Sea, Provisions, 253
Correspondence, see separate section of Index
Corrosion and Scale Formation, The Prevention of (Cumberland Process), 46
Corrosion of Condenser Tubes, 54
Corrosion of Iron and Steel, 286
Courts of Inquiry, "Mount Oswald," 38; see also "Accidents"
Craig, Taylor & Co., Ltd., 88
Cramp, A New Adjustable (Illus.), 50
Crosby-Jones, F., Corrosion of Iron and Steel, 286
Crow Bars (Illus.), 314
Cumberland Process for Preventing Corrosion and Scale Formation (Illus). 46
Cunard Co. (Mail Lines), 256, 290; "Aquitania," 282, 436, 462 (Illus.)
"Cyclops," U.S. Navy Collier, 353
Cylindrical Marine Boiler, double ended (Illus.), 205; single-ended, 206

Dalmer's Tube Cleaner (Illus.), 479
"Dante Alighieri," Italian battleship (Illus.), 38
Decked Lifeboat, McLean's (Illus.), 154
Deck Steam Pipes (Non-conducting Material), 342
Denny, Wm., & Bros. (1000th vessel), 87
Detachable Motors, 431
Devitt, Thos. L., Pres. Address, I.M.E., 147, (Illus.) 394
Devonport Dockyard, 4, 43, 75, 114, 156, 187, 263, 291, 332, 377, 430, 459
Dickie, G. W., Unsinkable Ships, 251, 285 (Illus.)
Diesel Engines for Marine Purposes (Illus.), 390, 423, 476
Diesel Engines, Performances of Vessels fitted with, 476
Diesel Engines, High-power, 415
Dimensions of Atlantic Liners, 73, 462
Dobbie McInnes, Ltd., Engine Room Alarm (Illus.), 482
Docks: King's Dock, Singapore, 53; Mersey Docks, 73; Hull Joint Dock (Humber Notes), 92, 442; White Star Southampton Dock, 150; Port Talbot (Bristol Notes), 365
Dockyards, The Naval, 4, 41, 74, 113, 156, 187, 263, 291, 332, 377, 429, 459
Dodd, T. J., Retiral of (Illus.), 166
Double-ended Cylindrical Marine Boiler (Illus.), 205; single-ended, 206
Dover-Ostend Route (Mail Lines), 336
Duncan, A., & Co., 479
Dundee Engineering Laboratories (Clyde Notes), 127

Earle's S.B. and Engineering Co., Ltd., 184
Editorial Notes, see separate section of Index
Elbe Estuary Motor Lightship (Illus.), 6
Elder, Dempster & Co., Ltd., "Ila" (Illus.), 382
Electrical Alarm for Marine Engines and Turbines (Illus.), 116
Electric Ship, "Tynemount" (Illus.), 106
Electric Starters and Regulators for Ships and Shipyards (Illus.), 266
Eltringham, J. T., & Co., New Shipyard, 310
Engineering Congress, U.S.A., 309
Engineering in the R.N., 185, 189, 257
Engineers and Engineering in the Royal Navy, 185, 189, 257
Engineers and Shipbuilders in Scotland, Summer Meeting, 475
Engineers' Certificates, New Board of Trade Regulations, 455, and also Correspondence
Engineers-in-Charge, Association of, 354
Engine Room Telegraph Alarm (Illus.), 122, 482
Engines (Illus.), Diesel, 6; Mirrlees-Diesel, 106; Junkers-Weser, 158; Experience with various oil-engined ships, 476; Kromhout, 341 Bolinders, 382; Parsons Motors, 398; Thornycroft, 427; Electric, 106
Esplen's Marine Engine Control (Illus.), 213, 275 (Mersey Notes)
Exhibitions—Shipping, Olympia, 1914, 144, 315, 356, 398, 435, 478; Motor, 169; Gas, 169; Panama Pacific, 289; Aero and Marine, 344; Printing, 425; Anglo-American, 475
Experience with Vessels fitted with Diesel Engines, 476

Fleets of the Mail Lines, 2, 36, 73, 118, 155, 195, 255, 289, 336, 388, 417, 457
Fly-wheel Adjustable Cramp (Illus.), 50
Foreign and Colonial Notes, see separate section of Index
Foreign Ships of War (Illus.), 38, 394
Foreign Vessels Launched and Engined (1913), 226, 284
Frahm's Anti-rolling Tanks on "Imperator" (Illus.), 51

"Galatea," H.M.S., 432
Gander, Jas. S., Combustion of Oil Fuel, 202, 259, 297
Gas Exhibition, 169
Geared Turbines, 350
General Arrangement of a Shipping Exhibition, 44
Giepel's Rapidity Steam Trap, 492
Glasgow Technical College, 2
Gray, Harry, Superheaters, 376
Greenfield's Boat Lowering Gear, 20
Gyro Compass, Sperry's, 72

Hall, Ltd., J. & E., Visit to Works, 478
Hamburg-American Co. (Mail Lines), "Imperator," 118, 155; "Vaterland," 429; "Priemus" (Illus.), 158; 1913 Report, 337; "Bismarck," 475
Harbour Work, Belfast (Belfast Notes), 131
Heath & Co., Ltd. ("Hezzamith Tap"), Illus., 144
"Hezzamith" Tap (Illus.), 144
High-power Diesel Engines, 415
Hill's Electrical Alarm for Marine Engines and Turbines (Illus.), 116
Hogan & Wardrop, Calten's Telegraphs (Illus.), 123
Holt, Alfred, & Co. (Mail Lines), 155
Home Industries, 70
Hudson's Bay (Mail Lines), 37
Hull Joint Dock (Humber Notes), 92
Hulls of Ships, A Cleaner for (Illus.), 342
Humphrey Pumps for Ship Propulsion (Illus.), 79

Igranic Electric Co. (Igranic Controllers), Illus., 266
"Ila" and "Ife," West African Coasters (Illus.), 382
"Imperator," Hamburg-American Co. (Mail Lines), 118, 155
Industrial and Trade Notes, see separate section of Index
Institute of Marine Engineers, Transactions, 88; Visit, J. & E. Hall, Ltd., 478; New Premises (Illus.), 89, 105, 152 (foundation stone ceremony), Illus.; Presidential Address, 147; Annual Dinner, 148; Annual Meeting, 343; Papers Contributed, 202, 215, 259, 286, 296, 311, 348
Institution of Naval Architects, Spring Meetings, 332; Annual Report, 376; Papers Contributed, 376, 390, 423, 476; Summer Meeting, 475
International Conference, Safety of Life at Sea, 162, 253 (Provisions), 287
"Iron Duke," H.M. Dreadnought (Illus.), 197
Isle of Man Steam Packet Co. (Mail Lines), 2, 37

Japanese Mercantile Marine (Mail Lines), 3, 197
Junkers-Weser Engines (Illus.), 158
"Jupiter" and "Neptune," U.S. Colliers, 353

"King Orry" (Isle of Man S.P. Co.), Mail Lines, 3
King's Dock, Singapore, 53
King's Visit to Liverpool, 18
Korting's Burner for Oil Fuel (Illus.), 260

Lasch, Robt., Crow Bars (Illus.), 314
Launches and Trial Trips, see separate section of Index
Launches in 1913, 217, 284
Launching Arrangements and Calculations (Illus.), 200
Legal Cases (S.s. "Teutonic"), Mail Lines, 2; "Titanic," 3
Letters to the Editor, see separate section of Index
Leyland Line, The Story of the, 71
Lifeboats, Decked, 154; Lundin, 165
Life-saving Appliances, 255
Lifting Gear (Illus.), 345
Lighthouses (Illus.), Longships, 81; Wolf Rock, 81
Lighthouses on the Coast of Cornwall (Illus.), 81
Lightship for the Elbe, Motor (Illus.), 6
Liquid Fuel, 348
Liquid Fuel Burners and Burning Arrangements (Illus.), 202, 259, 296
List of Vessels Engined (1913), 217, 284
List of Vessels Launched (1913), 217, 284
Liverpool Exhibition, 19
Liverpool, King's Visit, 18
"Llandudno," S.s., Repairs to the (Illus.), 78
Lloyd's Register—New Appointments, Chief Ship Surveyor, etc., 271; Scottish Staff, 310; Tonnage Launched (1911, 1912, 1913), 286
Lock Nut, A New (Illus.), 349
London Motor Lighterage Co., 340
Longitudinal Strength of a Vessel (Illus.), 347, 379
Longships Light (Illus.), 81
Lord Kelvin, Dedication of Memorial, 16
Low's Patent Calorifiers (Illus.), 431
Low-pressure and Astern Turbine, Combined (Illus.), 351
Lundin Lifeboat, 165

Mail Lines, The, 2, 36, 73, 118, 155, 195, 255, 289, 336, 388, 417, 457
"Majestic," White Star, Closing of Career (Mail Lines), 388, 417
Management and Upkeep of Boilers on a Tramp Steamer, 215
Manœuvring and Steering of Ships (Illus.), 149
Marine Boilers, Modern (Illus.), 205
Marine Engine Alarm (Hill's), Illus., 116
Marine Engine Control, Esplen's (Illus.), 213, 275 (Mersey Notes)
Marine Engineering Notes, see Industrial Notes
Marine Engineering Output of the United Kingdom for 1913, 216
Marine Engineer, Training of the, 354
Marine Engineers, see Institute of Marine Engineers
Marine Engines Built (1913), 217, 284
Marine Motor Notes, 18, 44, 83, 119, 168, 214, 270, 300, 340, 397, 434, 461
Marine Turbine, Advantages and Disadvantages, 350
"Marsala," Italian Scout (Illus.), 394
"Mauretania," Engine Room Accident (Mail Lines), 291
Mavor & Coulson's Motor for "Tynemount" (Illus.), 106
McLean's Decked Lifeboat (Illus.), 154
Merchant Tonnage Launched (1911, 1912, 1913), 286
Mersey Docks and Harbour Board, Annual Report (Mail Lines), 73
Metallic Lifebuoys, 338
Meyer Smith Liquid Fuel System (Illus.), 262
Milton, J. T., Cold Storage, 170; Diesel Engines, 390, 423, 476
Mirrlees-Diesel Engines (Illus.), 106
Modern Marine Boilers (Illus.), 205
"Monte Penedo," Performances of the, 86
Motor Barge, "Match" (Illus.), 340
Motor Boats for the "Aquitania" (Illus.), 427
Motor Exhibition, 169
Motor Lightship for the Elbe (Illus.), 7
Motors, Detachable, 431
Motor Ships—Lightship for the Elbe, 7; "Monte Penedo," 86; "Priemus" (Illus.), 158; Experience with Motor Ships, 476
"Mount Oswald," The Disappearance of the (Mail Lines), 38
Mountstuart Dry Dock Co., Ltd., 79

National Insurance Society, Seamen's, 6
Naval Architects, see Institution of Naval Architects
Naval Matters (Past and Prospective), 4, 41, 74, 113, 156, 187, 263, 291, 332, 377, 429, 459
Navigation, Safety of Life at Sea, Provisions, 253
"Neptune" and "Jupiter," U.S. Colliers, 353
"Niagara" Union Co. of New Zealand, 48
Niclausse Water Tube Boiler (Illus.), 206
Non-conducting Material for Deck Steam Pipes, 342
North East Coast, Institution of Engineers and Shipbuilders, Presidential Address, 151; Endowment Fund, 334; Summer Meeting, 475; Graduate Section, Papers Contributed, 328, 334
"Nottingham," Superheaters on the G.C.R. Co. Steamer (Illus.), 308

Obituary, see separate section of Index
Oddie Simplex Pumps (Illus.), 52
Oil Burner, A New, 144
Oil Engines—Diesel, 6; Mirrlees-Diesel, 106; Junkers-Weser, 158; Experience with various Oil-engined Vessels, 476; see also Engines
Oil Fuel Burners, Wallsend, 259; Rusden & Eeles', 260; Korting's, 260; Meyer's System, 261
Oil Fuel in Marine Boilers, Combustion of, 202, 259, 296
Oil *versus* Coal Fuel for Liners, 48
Old Atlantic Liners (Mail Lines), 417
O'Neill, G. A., Boilers of a Tramp Steamer, 215
Onyon, Engineer Capt. Wm. (Illus.), 21
Orient Line, The Story of the (Illus.), 191
Otago Harbour Board's Steamer "Dunedin" (Illus.), 356
Outboard Motors, 431

Pacific Mail Co. (Mail Lines), 156
Panama Canal (Mail Lines), 74, 389, 417
Panama Pacific Exhibition, 289
P. & O. Co. (Mail Lines), 155, 196, 289, 389
Paraffin Motor, Thornycroft's (Illus.), 427
Parsons, Sir Charles, Propulsion of Ships, 151
Parsons Combined Low-pressure and Astern Turbine (Illus.), 351; Geared Turbines, 353
Parsons Marine Motors (Illus.), 398
Patents Abridgments, see separate section of Index
Pembroke Dockyard, 5, 43, 75, 116, 158, 188, 265, 292, 334, 378, 431, 461
Performances of the Motor Ship "Monte Penedo," 86
Performances of Vessels fitted with Diesel Engines, 476
Piracy in Chinese Waters (Mail Lines), 417
Pitman Bed Raft (Illus.), 168
Pollock, James, Sons & Co., Ltd., "Ila" and "Ife" (Illus.), 382
Portsmouth Dockyard, 4, 41, 74, 113, 156, 187, 263, 291, 332, 377, 429, 459
Price & Belsham's Adjustable Cramp (Illus.), 50
"Priemus," Motorship (Illus.), 158
Propulsion of Ships, by Hon. Sir Chas. Parsons, 151
Pumps for Ship Propulsion, Humphreys (Illus.), 79
Pumps, Oddie "Simplex," 52

"Quarto," Italian Scout (Illus.), 394
"Queen Elizabeth," H.M. (Illus.), 293
Queenstown Calls (Mail Lines), 36, 73, 155, 290, 336, 458

Raft, Bed (Illus.), 168
Reciprocating Engines *versus* Turbines (Illus.), 350
Record Work in Shipbuilding, 87
Relative Size of Warships and Liners (Mail Lines), 73. Comparative Table, 462
Repairs to the s.s. "Llandudno" (Illus.), 78
Richardson, James, High-power Diesel Engines, 415
Richelieu and Ontario Steam Navigation Co. (Mail Lines), 3
Rich Marine Fire Apparatus, on "Imperator" (Illus.), 51
Robinson's Superheaters (Illus.), 306
Round the World in 35 days (Mail Lines), 37
Royal Mail Co. (Mail Lines), 197
Royal Navy, Engineers and Engineering in the, 185, 257, 189
Royal Naval Reserve, 146, 189, 258, 286
Rusden & Eeles' Oil Fuel Burner (Illus.), 260

Safety of Life at Sea, International Conference, 162, 253 (Provisions), 287, (Parliament Bill) 455
Sailing Ship, Survival of the, 338
Salvage Steamer "Dunedin" (Illus.), 356
Sankey & Sons' Lifebuoys, 338
Sawyer, John, Assist. Supt. Eng., Wilson Line (Humber Notes), 317
Scott's Boat Raising, etc., Gear (Illus.), 49
Seamen's National Insurance Society, 6
Seaplanes of To-day (Illus.), 436
Sheerness Dockyard, 5, 43, 75, 116, 157, 264, 292, 333, 431, 460
Sherratt, John (White Star Line) (Illus.), 479
Ship Cleaner, A Novel (Illus.), 342
Ship Propulsion, Humphreys' Pumps for (Illus.), 79
Shipbuilding Notes, see Industrial and Trade Notes
Shipbuilding Output (1911, 1912, 1913), 286
Shipbuilding Returns of the World (1913), 217, 284
Shipping Amalgamations (Mail Lines), 457
Shipping Companies, Histories of the, Anchor Line, 10; Leyland Line, 71; Orient Line, 191
Shipping, Engineering, etc., Exhibition, 144, 315, 356, 398, 435, 478
Shipping Exhibition, The General Arrangement of a (Illus.), 45
Shipping News, see Fleets of the Mail Lines, etc.
Ships (Illus.), (Passenger, Cargo, Motor Boats, etc.). Motor Lightship, 6; "Caledonia" (1862), 10; "Britannia" (1863), 11; "Europa" (1867), 11; "Anchoria" (1875), 12; "Furnessia" (1880), 13; "City of Rome" (1882), 14; "Circassia" (1903), 15; "Caledonia" (1904), 15; Motor Ketch, "Fort Churchill," 83; "Tynemount" (Electric), 106; "Cuzco" (1878), 191; "Orient" (1879), 192; "Orama," 195; "Osterley," 196; Motor Barge, "Match," 341; Motor Lifeboat, 427; "Aquitania," 465; "Britannia" (1840), 472

Ships and other Craft. Plans. Motor Lightship, 7; "Tynemount," 106; Motor Barge, "Match," 341; Otago Harbour Board's Steamer "Dunedin," 357; "Ila," Coaster, 383; Motor Boats for "Aquitania," 426; "Britannia" (1840), 472; "Aquitania" (Supplement, July, 1914)
Ships' Boats and Handling Gear for "Imperator" (Illus.), 85
Ships Completed during 1913, 217-284
Ships' Hull Cleaner (Illus.), 342
Ships on Hand in British Yards, 217-284
Ships on Hand in Foreign Yards, 217-284
Ships, Steering and Manœuvring of (Illus.), 149
Singapore Harbour Board, 53
Single-ended Cylindrical Marine Boiler (Illus.), 205
"Simplex" Pumps, 52
Smith, Capt. Jas., B.I.S.N. Co. (Illus.), 121
Smith, J. D., Engine Room Alarm (Illus.), 482
Somerscales, Francis (Illus.), 184
Speed Regulators, etc., for Ships and Shipyards (Illus.), 267
Sperry Gyro Compass, 72
"Springwell," S.s. (Illus.), 433
Steamship Lines, Historical Sketches. Anchor Line, 10; Leyland Line, 71; Orient Line, 191
Steam Trap, Giepels, 492
Steering and Manœuvring of Ships (Illus.), 149
Steering Telegraphs (Illus.), 122
Sternoline Bricks, 170
Stern Sonneborn Oil Co., 170
Submarine Signalling (Illus.), 384, 419
Submarine S1, Trials of the, 416
Summary of Shipbuilding Returns of the United Kingdom for 1913, 216
Superheater Corporation, Ltd, 306
Superheater, The "Robinson" (Illus.), 306
Survival of the Sailing Ship, 338

Tait, John, Water Circulator (Illus.), 491
Telegraphs and Indicators for Steering and Engine-room, Calten's (Illus.), 122
Thermofeed Pump Governor (Illus.), 312
Thompson, R. W., Breakdowns at Sea, 328, 331
Thornycroft Paraffin Motor (Illus.), 427
Thornycroft Water Tube Boiler (Illus.), 209
"Titanic" Engineers' Memorial Fund, 70, 271; Southampton Memorial (Illus.), 379
"Titanic" Legal Decision, Claims of Relatives (Mail Lines), 3
Torpedo Boat Destroyer, "Ardent," 384
Torpedo Submarine Ship Cleaner (Illus.), 342
Trade Notes, see separate section of Index
Training of the Marine Engineer, 354
Trial Trips, see separate section of Index
Tramp Steamer Boilers, 215
Trinity House, Ramsgate Station, 454
Triple Turreted Warships (Illus.), 39
"Tripolitania," Stranding of the (Illus.), 44, 70, 143
Trist, Ronald, & Co., Ltd., Thermofeed Pump Governor (Illus.), 312
Tube Cleaner, Dalmar's (Illus.), 479
Turbine, Advantages and Disadvantages of the Marine, 350
Turbine, Bladeless, 354
Turbines *versus* Reciprocating Engines for Marine Propulsion (Illus.), 350
"Tynemount," Electric Ship (Illus.), 106

Union Co. of New Zealand, "Niagara," 48
Unsinkable Passenger Ships (Illus.), 251, 285
Upkeep and Management of Boilers on a Tramp Steamer, 215

"Vaterland," Hamburg-American Co.'s (Illus.), 429
Vessels Engined in 1913, 217-284
Vessels fitted with Diesel Engines, 476
Vessels Launched in 1913, 217-284
"Viribus Unitus," Austrian Battleship (Illus.), 38
Vislok, Ltd. (Lock-nut), (Illus.), 349
"Volturno" Fire, 118, 155, 256

Wallsend-Howden Oil Fuel Burning System (Illus.), 299
Wallsend Oil Fuel Burners (Illus.), 259
Warships (Illus.), Italian "Dante Alighieri," 38; Austrian "Viribus Unitus," 38; "Iron Duke," 197; "Queen Elizabeth," 293; T.B.D. "Ardent," 384; Italian Scout Cruisers "Marsala" and "Quarto," 394; Submarine S1, 416
Water Circulator for Boilers (Illus.), 491
Watertight Bulkheads and their Strength (Illus.), 76
Water Tube Boilers (Illus.), 206
Welding, Castolin, 387
Welin Davit and Engineering Co., Ltd., Boat Gear, 84
Weser-Junkers Oil Engines (Illus.), 158
West African Coaster "Ila" (Illus.), 382
White-Forster Water Tube Boiler (Illus.), 210
White's Oil Fuel System (Illus.), 299
White Star Line (Mail Lines), 118, 256; Southampton Dock, 150, 301, 344 479
Wilson J. Veitch, Liquid Fuel, 348
Wireless and its Uses (Mail Lines), 418
Wireless Telegraph, Safety of Life at Sea, 254
Wolf Rock Light (Illus.), 81
Wood Charcoal, 311
World's Shipbuilding Output (1911, 1912, 1913), 286
World's Shipbuilding Returns (1913), 217-284

Yarrow Water Tube Boiler (Illus.), 208

Zulver's Liquid Fuel Burning Arrangements (Illus.), 296

PARAGRAPHS.

Aero, Marine, etc., Exhibition, 292
"Aerotug," The, 428
Anderson & Sons, Ltd., D., 77, 338
Anglo-Saxon Petroleum Co., 456
Arch Principle of Ship Construction, 44, 332
Arum Motor Ship, 456
Ashwell & Nesbit, 305
Austrian Shipbuilding, 492

Bailey & Co., Ltd., Sir W. H., 401
Beardmore, Sir Wm., 262
"Birkenhead," Wreck of the, 416
Board of Trade Appointments, 300
Boiler Shop Plant (Clyde Notes), 272
British Wrecks, 21; Lost Vessels, 397
Broadbent, Ltd., T. W., 399

Calendars, etc., 283
Cast Iron Brazing, 358
Cast Iron in Boiler Valves, 416
Catalogues and Leaflets, 265
Channel Tunnel, 199

Dermatine Hose, 483
Diesel Engine, The, 213
Dobbie McInnes, Ltd., 170
Dry Dock, A New, 456

Engineering Congress, International, 17, 48, 170, 428
Engineering Models, 459
Engineering Standards Committee, 72
Engineers for Tea Plantations, 142
Engineers of the Isle of Thanet, Society, 397
Escare & Denelle, 399

Fairfield Shipbuilding and Engineering Co., 453
Floating Dock for Upper Bosphorus, 50

Halley Fire Extinguishing Apparatus, 143
Harris, Wm., Board of Trade Surveyor (Clyde Notes), 440
Holzapfels, Ltd., 398
Howden, Jas. T., & Co., Ltd., 190
Hudson, John, & Co's Manganeseite, 313

Imperial Merchant Service Guild, 344
Institute of Marine Engineers, 20, 43, 83, 286, 483
Institute of Metals, 6, 355, 397, 483
Institution of Civil Engineers, 500
Institution of Naval Architects, 292
International Engineering Congress, 17, 48
Interests of the Marine Engineer, 252
Iron and Steel Institute, 500
Isherwood, J. W., 190, 343

Japanese Shipbuilding, 48
Jones, Sir Alfred, 17

Lawe Shipyard, The New, 295
Lighthouse Literature Mission, 204
Liverpool Marine Engineers and Naval Architects, 213
Lloyd's Register Returns, 4, 144; Staff Dinner, N.E. Coast, 321
Load Line Committee, 326
Lowndes, Cumberland, P.L.A., 374
Luke, Charles H., 117
Lundin Lifeboat Trials, 142

Marine Boiler Stays, Standard Screwing, 72
Marine Society, 401
"Mauretania," 271
Merchant Shipping Advisory Committee, 453
Model Engineering and Scientific Exhibition, 144
Moss, H. E., & Co., 21

National Experimental Tank, 21
Nautical Training, 300
N.E.C. Inst. of Shipbuilders and Engineers Scholarship, 286

Oil Exhibition, Earl's Court, 4
Oil Fuel Burning Apparatus, 326

Post Graduate Scholarship in Naval Architecture, 267
Printing, etc., Exhibition, 425
Progress of Warship Construction, 90

Quenched Spark Wireless Installations, 326; and Clyde Notes, 316

Record Ships built on East Coast of Scotland, 402
Rocket Life-saving Apparatus, 342
Romantic Use of Old Steamer's Bell, 339
Royal Indian Marine, 104
Rubber Exhibition, 295

Safety of Life at Sea, 188
Seaplanes of To-day, 456
Shipping Exhibition, 252
Shipwrights' Co., 143, 416
Shipyard Management Changes, 459
Siemens Bros. & Co., Ltd., Woolwich, 77
Simons, Wm., & Co., Ltd., 433
Smith, Major & Stevens, Ltd., Electric Lifts, 90
Smooth-on Manufacturing Co., 45, 170
Soudan Government, Engineer Vacancies, 142
Southampton Dock (White Star Co.), 150
Stern Sonneborn Oil Co., 144, 190
Swan, Hunter & Wigham Richardson, Ltd., 50, 311

Technical Societies (Meetings), 144
"Terra Nova," Antarctic Ship (Bristol Notes), 277
Testing of Lubricants, 144
Thames Iron Works, 305
"Titanic's" Captain, Memorial to, 143
Toope's Asbestos Co., Ltd., 349
Trist & Co., Ltd., Ronald, 89, 113, 493

Union Iron Works, San Francisco, 267
United States Metallic Packing Co., Ltd., 461
"Volturno" Captain's Presentation, 292

Walker, Sydney F., 418
Watt Anniversary Lecture, 258
Waygood Lifts on the "Britannic," 335
Welin, Axel, 161
Welin Davit & Engineering Co., 213, 262
Wet Work on the Waist, 118
White, Sir William, Proposed Memorial, 45, 213

INDUSTRIAL AND TRADE NOTES.

Barrow, see North-West of England
Belfast, 28, 63, 95, 131, 175, 244, 276, 320, 364, 406, 445, 489
Bristol Channel, 27, 62, 95, 131, 175, 245, 277, 364, 407, 446, 490
Clyde and Scotland, 22, 57, 90, 126, 171, 240, 272, 315, 358, 401, 440, 484
Dockyards, Naval, 4, 41, 74, 113, 156, 187, 263, 291, 332, 377, 429, 459
Hartlepools, The, see Tees and Hartlepools
Humber and District, 24, 59, 92, 127, 172, 241, 273, 317, 361, 404, 442, 486
Isle of Wight, see South of England
Manchester Ship Canal, see Mersey
Mersey and Manchester Ship Canal, 26, 61, 93, 129, 174, 243, 275, 318, 362, 405, 444, 488
North-West of England, 27, 62, 94, 130, 174, 243, 275, 319, 363, 406, 444, 489
Ramsgate Notes, 454
Southampton, see South of England and Isle of Wight
South of England and Isle of Wight, 25, 60, 93, 128, 173, 242, 274, 317, 361, 404, 443, 487
Tees and Hartlepools, 23, 59, 91, 127, 172, 241, 272, 316, 360, 403, 441, 485
Thames, 25, 60, 93, 129, 173, 242, 274, 318, 362, 405, 443, 487
Tyne, 359, 402, 440, 484
Wear, 360, 403, 441, 485

FOREIGN AND COLONIAL NOTES.

18, 55, 82, 120, 163, 212, 269, 365, 407, 434

OBITUARY.

Bailey, Sir William H., 165
Bailey, William, 400
Bell, David, 214
Blumer, John, 57
Bowden, J. A., 125
Bridges Webb, Major W., 93
Clover, Matthew, 481
Cowlrick, Commander, R.N.R., 273
Craig, Alexander, 164
Crush, Wm., 321
Davie, Robert, 321
Diesel, Dr. Rudolph, 125
Dunbar, Alexander, 434
Dunlop, J. G., 80
Forster, F. W., 129
Gill, Sir David, 320
Godson, Clement, 213
Hamilton, Archibald, 4
Healey, Joseph, 444
Howden, James, 165
Jones, William, 62
Lyall, John, 400
M'Credie, Alex. 143
Moffatt, R. C., 214
North, William (Humber Notes), 273
Orbell, Mr. (Thames Notes), 405
Robertson, J. G., 481
Soddart, Capt., 94
Swan, Sir Joseph, 480
Thearle, Dr. S. J. P., 164
Trewent, F. J., 480
Walton, Thomas, 57
Westinghouse, George, 346
Williamson, A. V., 317
Wilson, Basil, 4
Wishart, Engineer Rear-Admiral, 480

CORRESPONDENCE.

Board of Trade Engineers' Certificates, 55, 87, 123, 166, 189, 268, 327, 356, 428, 481
Design of Lifebelts, 481
Engineers' Reserve for the Royal Navy, 141
Fire Extinction on Ships, 125
New Board of Trade Regulations for Examination of Engineers, 55, 87, 123, 166, 189, 268, 327, 356, 428, 481
Royal Naval Reserve, 286
Shipbuilding Record for the Forth, 286

BOOKS REVIEWED.

All About Engineering, by G. D. Knox, 373

Board of Trade Examinations, Extra Masters, Masters and Mates Handbook, to the, by Charles Morris, 211
Boilers, Marine and Land, their Construction and Strength, by Thomas W. Traill, 211
British Corporation Register Book, 22
Brown's Nautical Almanack, 285
Bureau Veritas Repertoire General, 168

China Clippers, The, by Basil Lubbock, 492
Computations for Marine Engineers, by C. H. Peabody, 211
Customs Tariffs of the World, 387

Diesel, or Slow-Combustion Oil Engine, by G. J. Wells and A. J. Wallis-Taylor, 374
Directory and Gazetteer, Scottish, 57
Directory of Merchants, Manufacturers and Shippers of the World, 1914, 387
Directory of Passenger Steamers (Rhodes'), 284
Directory of Shipowners, Shipbuilders and Marine Engineers, 388
Directory of Telegraphic Addresses (Sell's), 372
Dock and Harbour Engineer's Reference Book, by Brysson Cunningham, 454
Dynamo, How to Manage the, by A. Bottone, 373

Electrical Installation Manuals, 453
Electric Circuit Theory and Calculations, by W. Perren Maycock, 454
Elementaries, Verbals and Drawings for Marine Engineers, by R. A. McMillan, 22
Elementary Graphic Statics, by John T. Wright, 453
Elementary Seamanship, A Manual of, by Com. D. W. Barker, 211
Engineering and Metallurgical Books, A Bibliography of, by R. A. Peddie, 373
Engineers' Year Book for 1914 (Kempe's), 372
Engine-Room Practice, by J. G. Liversidge, 492

Fighting Ships, by Fred T. Jane, 56
Fleet Annual, by Lionel Yexley, 374

Germanischer Lloyd Register, 372
Glasgow Shipping, Who's Who, 373
Glossary (Pocket) of Technical Terms for Engineers, etc. (English-German). 152
Graphic Statics, Elementary, by John T. Wright, 453
Guide and Log Book for Radio-Telegraphists, by W. H. Marchant, 22
Guide to South and East Africa, 285

Handbook of Wireless Telegraphy, by J. Erskine-Murray, 387
Handbook on the Steam Engine, by H. Haeder and translated by H. H. Powles, 374
Hazell's Annual, 1914, 284
Hydraulic and Pumping Machinery, Modern, by E. Butler, 167

Ice and Cold Storage Trades Directory, 372
Immingham and Grimsby Tide Tables (1914), 285
Institution of Naval Architects' Transactions, 168
Internal Combustion Engine, Primer of, by H. E. Wimperis, 89
Iron Founding, Practical, by J. G. Horner, 492

King's Ships, by Lieut. H. S. Lecky, 56, 330

Laying Off, or the Geometry of Shipbuilding, by E. L. Attwood and I. C. Cooper, 374
Leeds Chamber of Commerce Year Book, 89
Liverpool Shipping, Who's Who, 373
Lloyd's Register of Shipping, 144
London Shipping, Who's Who, 373

Marine Boiler Management and Construction, by C. E. Stromeyer, 374
Marine Engineers, Verbal Notes and Sketches for, by J. W. M. Sothern, 454
"Mechanical World" Electrical Pocket Book, 284
"Mechanical World" Pocket Diary, 284
Merchants, Manufacturers and Shippers of the World, Directory of, 387
Modern Pumping and Hydraulic Machinery, by Edward Butler, 167
Molesworth's Pocket Book of Useful Formulæ and Memoranda, 284
Munro's Marine Engineers' Annual, 327

Nautical Almanack, 1914 (Brown's), 285
Nautical Almanack, 1914 (Pearson's), 372
Naval Architects, Institution of, Transactions, 168
Naval Pocket Book (Thacker's), 57, 454
Navigation, Practical and Theoretical, by Comm. D. W. Barker, 211,
Navy League Annual, 284
Newcastle and Gateshead Chamber of Commerce Year Book and Commercial Review for 1914, 388

Passenger Steamers, Rhodes' Directory of, 284
P. & O. Co.'s Diary and Almanack (1914), 285
Pear's Cyclopædia, 284
Pearson's Nautical Almanack, 372
Pocket Book of Useful Formulæ and Memoranda (Molesworth's), 284
Practical Iron Founding, by J. G. Horner, 492
Primer of the Internal Combustion Engine, by H. E. Wimperis 89
Propulsion of Ships, Screw Propellers and Estimate of Power for, by Capt. C. W. Dyson, 453
Pumping and Hydraulic Machinery, Modern, by E. Butler, 167

Radio-Telegraphists, Guide and Log-Book, by W. H. Marchant, 22
Reed's Table of Distances, 373
Repertoire, General, of Bureau Veritas, 168
Rhodes' Shipping Annual and Directory of Passenger Steamers, 284
Royal Navy List, 373

Scientific and Learned Societies' Year Book, 284
Scottish Directory and Gazetteer (MacDonald's), 57
Screw Cutting for Engineers, by E. Pull, 167
Screw Propellers and Estimate of Power for Propulsion of Ships, by Capt C. W. Dyson, 453
Seamanship, Elementary, A Manual of, 211
Shipmaster's Handbook to the Merchant Shipping Acts, by S. D. Cole, 373
Shipowners', Shipbuilders' and Marine Engineers' Directory, 388
Steam Turbines, by J. A. Moyer, 492
Stoker's Guide to Promotion, 373
Sunderland Tide Tables (Reed's), 285

Technical Instruction for Wireless Telegraphists, Handbook of, by J. C. Hawkhead, 168
Telegraphic Addresses, Directory of, 372
Tide and Speed Tables, 285
Travelling Palaces, by R. A. Fletcher, 373
Turbines, Steam, by J. A. Moyer, 492

Verbal Notes and Sketches for Marine Engineers, by J. W. M. Sothern, 454

Whitaker's Almanack for 1914, 284
Who's Who, 1914, 284
Wireless Telegraphists' Handbook of Technical Instructions, 168
Wireless Telegraphy, Handbook of, by J. Erskine Murray, 387
Wireless Telegraphy and Telephony, by W. J. White, 22

Year Book of the Scientific and Learned Societies of Great Britain and Ireland, 84

BOARD OF TRADE EXAMINATIONS.

28, 50, 101, 181, 214, 283, 327, 452

PATENTS ABRIDGMENT RECORD.

29, 68, 102, 142, 182, 250, 282, 330, 372, 414, 453, 493

LAUNCHES.

Abelia, 494
Aberdale, 451
Absirtea, 131
Adelina, 371
Admiral Cradock, 412
Agapenor, 280
Agate, 178
Alcantara, 179
Alex. Hastie, 495
Allerton, 248
Almirante Latorre, 245
Andalusia, 179
Andromache, 248
Anerley, 411
Angelus, 248
Anglesea, 496
Anglo-Brazilian, 136
Ant, 66
Arabis, 369
Arabistan, 63
Arapaima, 324
Arawana, 450
Ardglass, 248
Ardgorm, 178
Ardgour, 324
Ardgrath, 99
Argentino, 32
Arnold Maersk, 368
Arolia, 499
Arum, 247
Ascain, 65
Attendent, 32
Aydon, 366
Aztec, 409

Baiara, 370
Baldersby, 63
Bamora, 413
Bandra, 280
Banka, 278
Barima, 324
Barle, 370
Barpeta, 370
Batsford, 247
Bawean, 498
Belize, 413
Belridge, 447
Benrinnes, 494
Berrima, 98
Bertrand, 177
Beryl, 178
Bestwood, 137
Biarritz, 367
Boeroe, 368
Bolton Castle, 413
Borda, 248
Borgland, 30
Bridlington, 63
British Monarch, 138
British Prince, 447
Broadgreen, 280
Bronwen, 136
Burdale, 247
Buresk, 412
Bywell, 133

Cabo Corrientes, 139
Cabo Santa Maria, 31
Cachoeira, 452
Calamares, 100
Caldy, 98
Camel Three, 495
Camperdown, 413
Campos Salles, 499
Cardiganshire, 139
Carlo, 66
Carnarvonshire, 250
Carrawdore, 326
Castle Eden, 278
Cedartree, 135
Ceylon, 32
Chakdara, 499
Charles E. Harwood, 134
Chesterfield, 176
Childwall, 498
Chongtu, 370
City of Corinth, 139
City of Exeter, 414
City of Mysore, 495
City of Nagpur, 500
City of Rangoon, 411
City of Vienna, 414
Clan Maccorquodale, 99
Clan Macquarrie, 100
Clotilde, 134
Colorado, 249
Comber, 99
Confederate, 98
Coringa, 248
Corinthic, 449
Cormorant, 249
Cornelis, 366
Corvin, 97
Croupier, 497
Cuidad de Buenos Aires, 450
Cyclops, 66

Daleham, 177
Dane, 134
Datetree, 281
Delagoa, 278
Deliverance, 500
Demeterton, 412
Den of Ogil, 139
Devon, 497
Discoverer, 178
Donax, 132
Dramatist, 248
Dromore, 30
Drujba, 448
Dunedin, 356
Dunnet, 324
Dunsley, 132
Durley Chine, 29
Dykland, 410

Eastern City, 98
Eburna, 137
Edwin Hunter, 410
Egba, 249
Egori, 451
Egyptian Transport, 279
Eibergen, 367
Elbruz, 368
Elf King, 98
Elfland, 366
Ellerdale, 134
Elsdon, 245
Elsinore, 176
El Zorro, 322
Emperor Alexander III., 139
Emperor of India, 248
Emperor Nicholas I., 138
Empress Ekaterina II., 32
English Rose, 370
Enterprising, 499
Eric Stroud, 498
Eupion, 249
Euripides, 326
Eustace, 63

Falernian, 496
Falls City, 177
Falstria, 371
Ferencz Ferdinand, 280
Ferencz Joszef Kiraly, 138
Fignlina, 135
Flying Breeze, 133
Formby, 413
Frimley, 30
Frisia, 322

Galatea, 432
Galiano, 140
Ganton, 450
Gardenia 496
Georgios, 30
Gifford, 64
Girl Kathleen, 66
Gladstone, 31
Glen Usk, 412
Grampian Range, 369
Graziella, 409
Great City, 369
Guido, 178

Hackness, 247
Haimara, 497
Hambleton Range, 133
Harbury, 134
Havre, 134
Headley, 247
Helenus, 139
Helgian, 136
Helmsloch, 133
Hercules, 495
Hermes, 447
Herring Searcher, 497
Herschel, 451
Hitchin, 134
Holme Rose, 66
Holmpark, 280
Holsatia, 413
Holtye, 65
Holyrood, 412
Honoreva, 97
Hororata, 280

Ice-Breaker, 447
Ile, 371
Ila, 325, 382
Imber, 323
Imperial Transport, 136
Innisclora, 31
Innishowen, 99
Innisjura, 31
Innisvera, 370
Innisulva, 451
Irrawadi, 100
Itonian, 450

Jacinth, 248
Jeannine, 137
Jedmoor, 245
John Donovan, 495
J. Oswald Boyd, 139

Kalimba, 325
Karmala, 370
Kelbergen, 495
Kelsomoor, 245
Keltier, 30
Kelvinia, 178
Keynor, 414
Khandahar, 66
Khyber, 248
Killdeer, 134
Kingfisher, 138
Knight Bachelor, 325
Kongsfos, 448
Kurdistan, 246

La Habra, 322
Ladoga, 494
Lance, 369
Landrail, H.M.S., 500
Levnet, 449
Lilium, 249
Linda Blanche, 499
Linkmoor, 409
Lizzie Birrell, 99
Llandovery Castle, 99
Llanstephan Castle, 99
Loch-na-Torran, 280
Lookout, H.M.S., 450
Lord Denman, 497
Lord Londesborough, 136
Lord Minto, 412
Lord Ritchie, 32
Lord Tredegar, 279
Lowther Castle, 371
Lucifer (H.M.S.), 278
Ludwig Weiner, 98
Luz Blanca, 96
Lynx (H.M.S.), 325

Macclesfield, 495
Macleay, 134
Magdala, 278
Malaspina, 33
Malatian, 178
Manchester Citizen, 64
Mansa Kil Ba, 135
Maple, 370
Mardinian, 29
Margaret, 279
Maricopa, 447
Maroc, 279
Maronian, 29
Maryland, 137
Mashobra, 280
Matthew Flinders, 451
Melania, 411
Mendip Range, 176
Mexico, 139
Michael, 369
Ministro Ezcurra, 413
Miranda, H.M.S., 500
Mississippi, 325
Missouri, 248
Mitcham, 132
Mobile, 323
Mongara, 323
Moorfoot, 139
Moorish Prince, 367
Morinda, 31
Munwood, 452

Naperian, 249
Navigator, 413
Nestos, 499
Nevisbrook, 132
Newlyn, 246
Newquay, 278
New Zealand, 176
Ngakuta, 65
Nigaristan, 137
Normandie, 176
Northern Coast, 247
Nortonian, 139
Novian, 249

Oceanos, 137
Offa, 137
Okino, 178
Oldfield Grange, 133
Ona, 498
Onwen, 246
Onyx, 178
Oranian, 371
Orduna, 140
Oriole, 178
Orla, 410
Orlock Head, 135
Ormara, 448
Orubian, 249
Owl, 32

Pacific Transport, 98
Paladin, 138
Panama Transport, 449
Patrol, 449
Pawnee, 97
Peary, 98
Pengreep, 412
Penistone, 135
Penmorvah, 133
Pentland, 324
Pensacola, 495
Petridge, 132
Phemius, 100
Pinewood, 409
Plntarch, 179
Polo, 66
Polyktor, 278
Ponrabbel, 451
Pontoporos, 133
Pontwen, 449
Port Albany, 322
Prince Leo, 99
Prince Palatine, 370
Princess Mary, 280
Principe de Asturias, 452

Radja, 99
Rhinass, 248
Rhodesia, 409
Riouw, 325
Robina, 450
Roepat, 249
Roman Prince, 278
Rosemoor, 367
Rosenborg, 449
Royal Transport, 178
Roye, 498
Rufford Hall, 448
Ryton, 177

Sable I., 450
Saint Cecilia, 100
Saint Egbert, 326
Saint Fergus, 31
Saint Kentigern, 248
Saint Patrick, 64
Saint Quentin, 325
San Francisco, 326
San Giorgio, 492
San Hilario, 246
San Isidoro, 245
San Jeronimo, 245
San Joaquin, 245
San Lorenzo, 278
San Melito, 367
San Nazario, 494
San Onofre, 494
San Urbano, 135
San Valerio, 246
San Wilfredo, 322
San Zeferino, 322
Santa Isabel, 498
Santa Theresa, 413
Savan, 132
Saxonian, 451
Seapool, 135
Seiyo Maru, 31
Selene, 280
Shahristan, 134
Shirley, 65
Sicily, 279
Sif, 139
Sikh, 452
Silva, 98
Sinsen, 447
Sir William Matthews, 413
Snipe, 412
Socrates, 99
Solimoes, 132
South Pacific, 65
Sparta, 32
Spectator, 451
Speeton, 64
Sportsman, 498
Springwell, 368
Stanley, 247
Starbeam, 498
Star of England, 326
Star of Victoria, 179
Steelton, 447
Strabo, 138
Strathclova, 138
Strathdnne, 66
Strathella, 138
Strathnethy, 66
Streatham, 326
Suffolk Coast, 178
Swanmore, 97

T. B. Taylor, 500
T. R. Fereus, 136
Taff, 412
Takado, 280
Tamaha, 448
Tanda, 414
Tascalusa, 177
Tatarrax, 249

Feano, 136
Fentonian, 366
Fhomas Stratten, 450
Firreno, 246
Fokyora Maru, 31
Fottori Maru, 99
Fowy, 369
Fransvaal, 325
Fransylvannia, 499
Frewellard, 495
Friton, 66
Froilus, 278
Fubantia, 179
Fuscan Prince, 137

Ulysses, 32
Ulysses, 63

Valegarth, 64
Van Hogendorp, 367
Varela, 410
Varsova, 496
Vasilefs Constantinos, 97 and 497
Veendyk, 323
Vimeira, 499
Violet Flower, 413
Visegrad, 64
Volana, 178

Walpole, 497
Welbeck Hall, 323
Westville, 30
William H. Raeburn, 138
Winamac, 65
Wingate, 246
Winterton, 96
Wolverton, 247

Vessels not named.

Admiralty Caissons (Swan, Hunter and Wigham Richardson), 96, 496

Barge (Goole Shipbuilding and Repairing Co., Ltd.), 450

Caisson (E. Finch & Co.), 412
Canadian Car Ferry and Ice Breaking Steamer (Cammell, Laird & Co.), 280
Cargo Boat (John Duthie Torry Shipbuilding Co.), 31
Cargo Steamer (Hall, Russell & Co., Ltd.), 451, and Trawlers, 498

Dredgers (W. Simons & Co.), 66, 138, 371, 499

Fishery Cruiser (Dublin Dockyard Co.), 179
Floating Dock (Wm. Hamilton and Co.), 370, a Steamer, 451

Hopper Steamers (Wm. Simons and Co.), 31, 99, 100
Hopper Steamers (Fleming & Ferguson), 179, 248

Lightship, No. 19 (Bow, McLachlan and Co.), 324
Light Vessel, No. 80 (H. & C. Grayson, Ltd.), 451

Screw Steamer for Zillah Co. (Ramage & Ferguson), 31
Screw Steamer (Wm. Gray & Co.), 177
Screw Steamer (Scott & Sons), 179
Steam Drifter (Scott & Yule), 66
Steamer (Osbourne, Graham & Co.), 323
Steam Launch (Ed. Hayes), 324, and Steam Tug, 248
Steel Screw Steamer for Indra Line (C. Connell & Co.), 31
Steel Screw Steamer (D. & W. Henderson & Co., Ltd.), 31
Steel Screw Tug (Cochrane & Sons), 96, and 2 Trawlers, 324

TRIAL TRIPS.

African Transport, 67
Alaunia, 180
Alcantara, 498
Alsatian, 250
Andes, 101
Anglo-Brazilian, 250
Arabistan, 101
Arapaima, 450
Arawana, 497
Ardent, 384
Argentino, 140
Arnold Maersk, 411
Arum, 448
Asturiano, 34
Atherstone, 67
Attendent, 100
Aydon, 409
Aztec, 494

Baiara, 450
Bamora, 498
Banka, 369
Bertrand, 282
Biarritz, 410
Boeroe, 449
Borgland,101
British Monarch, 181
Bronwen, 250

Cabo Corrientes, 324
Calamares, 282
Cardiganshire, 282
Carlo, 101
Carnarvonshire, 371
Castle Eden, 324
Cementcrug, 409
Ceramic, 34
Ceylon, 68
Chalister, 101
Chesterfield, 282
City of Corinth, 181
City of Exeter, 500
City of Norwich, 34
City of Rangoon, 496
City of Vienna, 452
Colon, 67
Cornelis, 448
Corvin, 140

Demeterton, 497
Den of Ewnie, 180
Doralia, 410
Dredgers, 140
Durley Chine, 67
Dykland, 448

Ecaterini Matsouki, 101
Edward L. Doheny, 140
Egba, 413
Egyptian Transport, 323
Eibergen, 409
Elfland, 447
Ellerdale, 180
Elsdon, 322
Elsinore, 250
El Toro, 34
Emperor Alexander III., 325
Empress Ekaterina II., 181
Eumaeus, 68
Eustace, 101
Evangelos, 33

Falls City, 250
Ferencz Ferdinand, 451
Figulina, 281
Floridian, 34
Flying Breeze, 250
Frimley, 141
Frisia, 409

Gelria, 141
Giacoma Feltrinelli, 450
Gifford, 100
Glen Usk, 498
Grado, 492
Graziella, 495
Great City, 412
Gyula, 366

Hackness, 281
Harbury, 180
Headley, 323
Hesperos, 33
Holsatia, 451
Holtye, 101

Ile, 498
Imber, 410
Imperial Transport, 180
Ingoma, 67
Irrawadi, 180

J. Oswald Boyd, 180

Kalimba, 413
Kandahar, 101
Kathlamba, 68
Katoomba, 34
Keltier, 68
Khiva, 281
Kirnna, 34
Kinghsber, 180
Kongsfos, 496

Lennox, 498
Linkmoor, 495
Llandovery Castle, 281
Lord Tredegar, 324
Lysander, 180

Manchester Civilian, 101
Manora, 33
Mansa Kil Ba, 282
Maple, 498
Mardinian, 101
Maricopa, 495
Maryland, 180
Mashobra, 370
Melania, 496
Mendip Range, 281
Midland, 100
Missouri, 371
Mobile, 411
Monfalcone, 492
Mongara, 496
Moorish Prince, 447
Morinda, 101
Munwood, 499
Muristan, 141
Myola, 180

Newlyn, 282
Newquay, 367
New Zealand Transport, 25
Niagara, 48
Nigaristan, 250
Nominoe, 33
Northern Coast, 324
Nortonian, 180
Novgorod, 34
Novian, 325

Ocean Harvest, 33
Ocean Pilot, 33
Ocean Transport, 67
Oceanos, 250
Onwen, 322
Orange River, 411
Orduna, 282
Orlock Head, 180
Orna, 179
Osage, 66

Pacific Transport, 250
Panama Transport, 496
Pangbourne, 324
Paris, 67
Patuca, 33
Pengreep, 449
Penhallow, 68
Penistone, 179
Penmorvah, 179
Phemius, 181
Photinia, 34
Polyktor, 322
Port Albany, 495

Radja, 281
Riouw, 413
Robina, 498
Roman Prince, 366
Rosemoor, 410
Royal Transport, 250
Ruel, 141
Ryton, 250

Saint Cecilia, 250
Saint Kentigern, 281
San Francisco, 500
San Gregario, 67
San Hilario, 281
San Isidoro, 409
San Jeronimo, 323
San Lorenzo, 323
San Silvestre, 34
San Urbano, 180
San Zeferino, 409
Sarpedon, 140
Saxilby, 282
Scythian, 67
Sebastian, 324
Shirley, 101
Sicily, 369
Sir Hugh Bell, 67
Spitfire, 34
Springwell, 433
Stanley, 281
Star of England, 414
Star of Victoria, 282
Strabo, 141
Südmark, 67
Swanmore, 141

Tamaha, 496
Tanis, 180
Tascalusa, 282
Tatra, 67
Tenadores, 34
Tirreno, 322
Towy, 412
Transvaal, 413
Tregarthen, 33
Tuscan Prince, 250

Ubier, 449
Ulysses, 141

Van Hogendorp, 496
Varela, 496
Vasilefs Constantinos, 141
Veendyk, 410
Visegrad, 101

Wascana, 33
Welbeck Hall, 409
Westerdyk, 34
Westville, 68
W. H. Dwyer, 67
Winamac, 101
Wingate, 323
Winterton, 141
Wolverton, 282

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And Naval Architect.

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NAVAL POLICY.

IT is seldom that a statement on naval policy has been awaited with so much interest as that made by the First Lord of the Admiralty in the House of Commons last month, and the fact that such statement dealt largely with the important question of oil fuel for the navy gave it an exceptional interest to marine engineers. Not only was the development in the use of oil fuel dealt with in considerable detail, but the extent to which the Admiralty propose to use such fuel in the future was fully gone into. It is interesting to note, having regard to what we stated in our May issue, that the First Lord's opinion is that "the problem of oil fuel was not one of quantity, but of price." He said that the output of crude oil last year was 50,000,000 tons, and that the naval consumption did not amount to 200,000 tons. In addition to the foreign sources of oil there were home supplies available, after a process of manufacture has been gone through, such as oil from Scotch shale, which he estimated would produce 400,000 to 500,000 tons per annum for the next 150 years. In addition, he mentioned the existence of a large area of oil-bearing clays in England. We entirely agree with the view expressed that "the open market has become an open mockery" so far as oil is concerned. With these conditions to combat, and to avoid paying an excessive price for the commodity, the field of competition has to be entered and an entirely new policy promulgated. The new policy may be divided into two distinct parts, one for the present and the other for the future. The Admiralty can become the owner and producer of its own liquid fuel supplies, so as to deal with crude oil as it comes into the market at a cheap price. From the statements made it appears clear that for the immediate future steps have been taken to enter into a series of contracts for a period of five years whereby a regular and adequate supply of oil fuel can be assured until the main policy of State ownership of oil sources can be carried into active operation. The First Lord disclosed the fact that contracts, which were considered by experts to be of an extremely advantageous character, were to be entered into with the Mexican Eagle Company, and that such company was directed by Lord Cowdray, and Lord Murray, of Elibank, was also connected with it. It may be well to point out that it is not the demand for crude oil itself that controls its price, but the demand for some of its constituents, and so long as there is a practical monopoly for the supply of petrol, so long will the supply and price of crude oil be an unstable factor; but as soon as healthy competition, both as to supply of crude oil and the refining of it, are brought into being, the conditions which have obtained in the oil market of recent years will materially change. This is really the gist of the Admiralty policy, and it is one in which the shipping community, interested in oil, might consider to their material advantage. Surely it is not beyond the bounds of possibility for shipowners to combine and purchase crude oil for the purpose of refining it, and coming into the market as a competitor of substantial weight. Unless this is done it seems to us that oil is placed at a great disadvantage as compared with coal, and that the latter has little or nothing to fear in the near future, from any calorific advantages that oil may have over coal, until a real open market has been set up in oil, and the open mockery of to-day has been done away with. This branch of the subject absorbed so much of the First Lord's speech, that the large question of general naval policy received small attention.

CONTRABAND OF WAR.

WE have in the past taken considerable interest in the, at present, unratified Declaration of London, and we think it desirable to call attention to a case which affords clear evidence that either considerable ambiguity exists in the phraseology of its sections, or that the decision of the Greek Government has been wrongly based on the principles underlying the provisions of the Declaration. It would appear that last December the Greek naval vessel *G. Averof* seized the British steamship *Trevarrack* while the latter was on a voyage to Kustendje, Roumania, with a cargo of coal and coke, such port at the time, being one of a neutral country. It is clear that to reach such post the vessel had to traverse the waters of one of the belligerents, *viz.*: Turkey, and ran the risk of having the cargo seized by Turkey and used for the purposes of war. The claim to seize could have been strongly emphasized if the cargo was recognised as contraband and was intended for one of the belligerents. It is not clear that coal was really contraband in this instance, as although it might be if being sent to a belligerent for war purposes, on the other hand it may not be so, as the coal might be sent to a person in a non-belligerent country for peace purposes. As a matter of fact the Greek Minister of Marine while deciding that coal was absolute contraband from their standpoint, admitted that neutral states were not so bound and he had to rely on Articles 30 and 31 of the Declaration of London to support their contention. It is somewhat remarkable that these particular articles are relied upon in this case to the exclusion of four other Articles, *viz.*: 33 to 36, which specifically deal with the question of what is conditional contraband and sets out in unmistakable language that goods which are conditional contraband are liable to be captured if for the actual use of the forces, or of a Government Department belonging to a belligerent. It is interesting to note that the Greek Prize Court in dealing with the matter refused to adopt the contention of the Greek Government, that they were justified in capturing cargo if the vessel is destined to call at an enemy's port before reaching the neutral port to which the cargo is consigned; in other words Articles 30 and 31 apply to cargo which they considered to be absolute contraband. The court refused to condemn the cargo as contraband, but decided the seizure was legal, subject to the payment of its value. It seems to us that the Greek Government have misread the Articles altogether and if this is so, it only points out very forcibly how dangerous is the position under the

Declaration of London, particularly as it has not yet been ratified.

The further development of this matter will be distinctly interesting as the decision of the Prize Court does not seem to meet with the acquiescence of the Greek Government and an appeal has been lodged at the Appeal Court at Athens. This case is one which gives point to the criticism passed at the time when the question was being debated in the House of Commons, and emphasizes the urgent necessity there is for putting the matter on a much more stable basis than it is at present. One can only hope that the nations interested will one and all feel that it is to the interest of everyone to put the matter upon an absolute basis agreeable to all and then get the Declaration ratified.

SIGHT TESTS.

THE question of sight tests for colour blindness has been raised again in the House of Commons on the ground as to whether the wool tests were the only tests used, and if so, and in view of the fact that such tests had been shown to be defective, it was not advisable to add someone with knowledge and experience of the lantern test, to the body advising the Board of Trade. From the answer given by the President of the Board of Trade it appears that the lantern test has recently been added, in addition to which various spectroscopic tests and tests with Nagel's anomaloscope are now made. This really looks as if some progress is being made owing to the pressure brought to bear on the matter by the shipping community. The President was induced to state that if the proposals of the Royal Society Committee, which is dealing with the matter, are considered to be excessive the Board of Trade would reduce them. It will be recognised by all right-thinking people that what is wanted is a really sensible and practical test or set of tests to decide the matter at the initial stages and thus save time, trouble and anxiety.

THE GLASGOW TECHNICAL COLLEGE.

THIS College, the only school of Navigation in the Kingdom to possess a steam training-vessel, has had the misfortune to lose its little craft after a very brief experience of her advantages. Some little time ago the present First Lord of the Admiralty determined to effect a minor economy by disposing of certain yachts which were kept up for the purpose of conveying admirals round the Home Stations, and amongst others the *Vivid* was sold out of the fleet. She was an iron screw yacht of about 550 tons displacement, rigged as a barquantine, so that she afforded opportunity for instruction in the management of sails. Her new owners only acquired her in April last, and at the beginning of July she struck a rock near Colonsay and sank, fortunately without loss of life. Her crew and the cadets—of whom there were about fifteen on board—were landed at Oban. The *Vivid* was, before she went into the service of the Admiralty, a private yacht under another name, and for some years was the property of the first Lord Inverclyde.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Allan Line

has recently been able to dispose of two of its single-screw steamships. These are first the *Hungarian*, built in 1902 at Glasgow by Messrs. Napier & Miller. She is a vessel of 4,508 tons gross register, fitted with a set of triple-expansion engines by Messrs. Dunsmuir & Jackson. The other is the *Ontarian*, a couple of hundred tons smaller. She was built at Port Glasgow by Messrs. Robert Duncan & Co. in the year 1900. The last-named vessel is, it is understood, purchased by the Chargeurs Réunis of Havre.

The Isle of Man Steam Packet Company

have obtained delivery of their new steamship, the *King Orry*, from the builders, Messrs. Cammell, Laird & Co., of Birkenhead. This vessel bears a name which has been held by successive steamships of the fleet during the best part of the long existence of the Company. But, of course, she is a vast improvement even on the last holder of the title. She left Liverpool for Douglas on her maiden trip on the 8th July and accomplished the voyage in three hours 10½ minutes from the Rock, maintaining a speed of 21½ knots, which, for the purposes for which her owners intend her, is exceedingly high. She is not designed for the summer traffic from the Mersey, but will be employed during the season on the Fleetwood run. It is interesting to note that at the last annual general meeting of the Company the shareholders were requested by the Board to select the name for this ship, and there seems to have been a singular degree of unanimity in favour of calling her *King Orry*, a name which has not only achieved a reputation in the fleet, but which also excites patriotic fervour in the breast of Manxmen, as it commemorates a semi-mythical hero, who formerly, it is said, ruled over the little island in the Irish Sea.

Those who go down to the sea in ships

in the capacity of seamen and engineers, will be interested in the important judgment which has just been pronounced by the Court of Appeal in the case of Buls *v.* the owners of the steamship *Teutonic*. The claimant in this case was a fireman who met with an accident in the course of his work at sea. The results seemed at first trivial and the man did not give up his duties during the voyage. On arrival at the port of discharge he was paid off in the ordinary course and signed the usual release to the owners on payment of the wages due to him. Then the injury he had received seemed to be more serious, and eventually a claim under the provisions of the Workmen's Compensation Act was formulated in respect of the accident which had befallen him. The facts do not seem to have been in real dispute. But the claim was contested because, it was urged, the right to make such a claim was barred to the man because he had signed the statutory release before the superintendent on paying off. The County Court judge before whom the claim was first heard found in favour of the claimant, and on appeal the Court of Appeal have reaffirmed his decision, Lord Justice Kennedy, who delivered the judgment of the Court, explaining that the release in question only referred to the particular contract of service of the seaman with regard to which the superintendent was, under the Merchant Shipping Act, the person to give the discharge. It would be premature to consider a seaman's rights to compensation at the time when he was being paid off. This decision is obviously important, as, had it been otherwise, a great part of the benefits conferred by the Compensation Acts might have in many cases been denied to the sailor.

The Turbine Principle

seems to have commended itself warmly to the management of the Belgian State Railway. The *Ville de Liege*, the second of the pair of sisters now under construction for the Dover-Ostend service, was launched in the beginning of July from the yard of the Cockerill Company at Hoboken, near Antwerp. On that occasion the Minister, who is charged with the management of the railway and steamship system, announced the intention to construct five more such vessels for the service. As the *Ville de Liege* is the fifth of the type to be launched, and as for many years the whole work of communication was maintained by a fleet of paddlers which did not exceed nine

in number, we may look forward to a not far distant time when even the Belgian State Railway—one of the most faithful adherents to the paddle system—will cease to possess a single specimen of the obsolete type of steamship. The *Ville de Liege* is to be a 24-knot ship and will have all the latest improvements for safety, including, of course, a wireless installation and a system of Stone-Lloyd doors in her bulkheads.

The Richelieu and Ontario Steam Navigation Company, which brought into its ownership a considerable number of Canadian river and lake Companies last year, is now absorbing further concerns and is changing its name to the Canadian Lakes and Ocean Transportation Company. The most important of the new constituents is undoubtedly the Quebec Steamship Company, which runs a purely local line between Montreal and Pictou on the one hand, but which also maintains an important ocean service between New York, Bermuda and the West India Islands with fairly large vessels. By this means the combine will not only obtain practical control of the trade of the St. Lawrence system and of the Canadian Great Lakes services, but will also put itself in touch with the other British possessions in the Western Hemisphere.

Wireless Telephony

for the use of sea-going ships, seems to have come into the range of practice, for it is announced that two Japanese shipping companies, the Toyo Kisen Kaisha and the Osaka Shosen Kaisha have resolved to fit some at least of their ships with wireless telephonic apparatus. The system they propose to employ is one invented by a Japanese, Mr. Torigata, of Tokio, and it is said that the range to which messages can be heard already extends to a distance of not less than 700 miles.

The Loss of the "Titanic."

The four cases brought against the Oceanic Steam Navigation Company by relatives of steerage passengers lost in the *Titanic* have all been decided by the Court of the King's Bench Division against the owners, and damages have been awarded to the claimant in each case for an agreed sum of £100 and general costs. The plaintiffs alleged that the death of their relatives was brought about by the negligence of the servants of the shipowner. The principal grounds on which negligence was charged were two-fold. It was said that there was a bad look-out and that the speed of the vessel was excessive in view of the proximity of ice and of the prevailing atmospheric conditions. In relation to the first ground of alleged negligence the question of the delivery of the ice warnings from the various liners in the neighbourhood came up, and in that connection the Court was of opinion that, though the wireless operators on the *Titanic* undoubtedly had the important message sent off by the Atlantic Transport Company's *Mesaba*, there was no evidence that that warning ever reached the bridge. The charge of bad look-out was held not to be made out. But the Court was of opinion that several warnings were received from various ships and communicated to the navigating officers, and that in view of those warnings there was negligence in proceeding at the speed which the ship maintained. But though the plaintiffs had thus succeeded in proving negligence they were met by another defence to the effect that there were certain conditions printed on the back of the contract ticket which absolved the shipowner from any responsibility for the negligence of his servants. The evidence adduced at the trial, however, satisfied the Court that, in the case of three of the drowned men, the existence of these conditions was not sufficiently brought to the notice of the passenger and so could not be held to bind him or those who claimed through him. In the fourth case it was held that the passenger was duly notified of the endorsement, for his ticket was purchased from a lady at Skibbereen who made it a practice to satisfy herself that every purchaser of such tickets knew and understood the conditions. In this case then a third point arose. Were the conditions which claimed to exempt the shipowner from liability effective? The Merchant Shipping Act speaks of the conditions appearing on "the face of the ticket," and says that the contract is to be in a form approved by the Board of Trade. Mr. Justice Bailhache, who tried the case, was of opinion that anything printed on the ticket was, for this purpose, printed on the face, even if the putting of the words "see back" on the front did not of itself incorporate the endorsement with the matter on the front. But beyond all this he was of opinion that the words "the form of the ticket" meant everything that appeared upon it. It was clear that the conditions on which the defendants relied had never been submitted to the Board of Trade and so could not be said to have the department's approval, and for these reasons he held that the exceptions claimed by the owners were not effective. So in all four cases judgment was entered for the plaintiffs. It is said that the Oceanic Steamship Navigation Company will appeal, and indeed the questions raised by these cases are of the highest importance to them—for there are understood to be other claims open. Moreover, shipowners generally will be anxious to know whether they can or can not divest themselves of liability to emigrant passengers for the negligence of their officers and crew.

Around the World.

A certain interest has attached to the record in the rapid circumnavigation of the globe, especially in view of Jules Verne's famous book "Around the World in Eighty Days," in which, it may be remembered, the hero, in order to fulfil his undertaking, had recourse to all sorts of desperate expedients, including the hiring of special trains and steamships, to make his missed connections. Nowadays several things militate against the maintenance of great interest in such journeys. To begin with they have ceased to be so largely sea voyages and have become to a great extent train journeys. The railway connections are so arranged that catching a certain train means a clear run from, say, the Western Russian frontier to the shores of the Pacific. Thus the voyager must either catch the train at which he has originally aimed or he must wait for the next—the hiring of a special over so many hundreds of miles being a prohibitive matter on account of the enormous cost. So too when it comes to the sea transit. To accomplish a record, now that the round has been done well under forty days by more than one adventurer, the fastest steamship on each particular station must be used, and such vessels must be caught for their scheduled trips, as they cannot be found unemployed and chartered for a special voyage, even by a Vanderbilt or a Rothschild. Yet at the present time the "New York Evening Sun" has thought it worth while to send one of its staff, Mr. John Henry Mears, to attempt to reduce the time to thirty-five days. To fulfil this mission Mr. Mears left New York by the *Mauretania* on the 2nd July, 1913, hoping to be back there by the 6th August. He reached Fishguard in due course and was announced as being about to proceed to London by aeroplane. This intention, however, did not materialize, and the traveller proceeded by the possibly slower, but undoubtedly surer, special train of the Great Western Railway. Thence he proceeded to Paris and Berlin and at the time of writing is no doubt killing time on the weary train journey across Siberia.

Emden as a Commercial Port

is now attaining some little importance. The Hamburg-American Company has already made it the headquarters of at least one of its numerous services. Now the Norddeutscher Lloyd, under the agreement made with the Prussian Government at the end of 1912, announces that its new service from Emden to Australian ports will be inaugurated on the 2nd October. With a view of developing the trade of the port both these important steamship Companies are opening offices in the town.

The Japanese Mercantile Marine.

Most people who are concerned with shipping matters have observed how largely the Japanese have of late been purchasing foreign-built steamships to meet the increase of their trade. The Japanese Customs Tariff, no doubt for the double reason of obtaining revenue and of encouraging native shipbuilding, exacts a considerable import duty on foreign vessels placed on their register. But some brilliant shipowner had discovered that the tax might be avoided by registering his purchases at Dairen in the Kwantung Territory. No objection to this procedure seems to have been taken at first. But now the practice has become so general that legislation is being undertaken to render a continuation of the present state of things impossible. As the duty involved amounts to from 20s. to 30s. a ton, according to the age of the vessel, the matter would seem to be one of considerable importance, for cargo vessels of up to, say, 4,500 tons have recently been purchased for registration at Dairen.

Shipowners

must assuredly be hard pressed for ideas as to possible

novelties for introduction into new steamships. The Rotterdam Lloyd, however, seems to have thought of a useful innovation for the benefit of the passengers by their steamship *Rotterdam*. In this vessel they have installed a safe deposit system, by placing a considerable number of safes of various sizes in the purser's cabin. Passengers are thus enabled to relieve themselves of all anxiety as to the safety of their valuables from light-fingered gentry during the voyage, as the safes can only be opened by the joint consent of the passengers renting them and the officer of the ship, owing to the fact that two keys are required to unlock them. With the increase in size and in the consequent numbers of passengers and crew, the chances of black sheep being shipped are largely increased, whilst the hope of detecting a successful thief is proportionately diminished. It is probable that the system found so successful in the *Rotterdam* will be extended not only in this, but in other companies.

Armed Merchantmen.

The latest vessel to be fitted with guns by the Admiralty, the White Star Co.'s *Ceramic* is also the first merchant ship to have a real gun trial. Owing to the peculiar conditions of the ownership of White Star vessels—the shares in the Oceanic Steam Navigation Company being held by an American Corporation—there have been questions in the House of Commons as to the expediency of arming these steamers, and as to the probable action of their owners if this country should unhappily be involved in war. Mr. Churchill returned what seemed a satisfactory answer to these questions, and the Admiralty seems further to have fully considered and satisfied itself that the objections of Mr. Molteno are of no importance. That gentleman was against the principle of fitting merchant ships, or at least passenger ships, with guns at all, as he feared that their presence would constitute a danger to those on board from hostile warships with any countervailing advantage.

An oil exhibition of an International character is to be held at Earl's Court, London during the months of March and April next year. The opening day, as at present fixed, is March 21st.

Obituary.—Mr. Archibald Hamilton.—The death occurred with painful suddenness on July 24th, while visiting at a friends' house, of Mr. Archibald Hamilton, C.E., chief assistant to Mr. W. M Alston, M.I.C.E., engineer to the Clyde Navigation Trust. Mr. Hamilton who was 62 years of age, was a native of Motherwell. He was well-known in shipping and shipbuilding circles and his sudden demise caused very general regret.

Mr. Basil Wilson, a former director in Messrs. Harland and Wolff, Ltd., died on July 9th at the age of 67 years. He was apprenticed to Messrs. McNab of Greenock, and afterwards entered the firm of Messrs. Harland & Wolff. Mr. Wilson was a member of The Institution of Civil Engineers, and had of late years a very extensive practice as a consulting engineer.

Lloyd's Register.—The Returns compiled by Lloyd's Register of Shipping, which only take into account vessels the construction of which has actually begun, show that, excluding warships, there were 543 vessels of 2,003,241 gross under construction in the United Kingdom at the close of the quarter ended 30th June, 1913. The tonnage now under construction is 60,000 tons less than that which was in hand at the end of last quarter, but exceeds by about 229,000 tons the tonnage building in June, 1912. Of the vessels under construction in the United Kingdom at the end of June, 434 of 1,538,198 tons are under the inspection of the surveyors of Lloyd's Register with a view to classification by this Society. In addition, 125 vessels of 559,669 tons are building abroad under the Society's survey. There are thus now actually building under the supervision of Lloyd's Register 559 vessels of 2,097,867 tons. This total is within 14,000 tons of the figures reported in the March return which were the largest ever reached. As to Foreign and Colonial Shipbuilding, the latest returns show that, excluding warships, there were under construction at various ports abroad, 429 vessels of 1,443,317 gross tonnage, 377 vessels of 1,421,368 tons being steam and 52 of 21,949 tons sail. Vessels of less than 100 tons are not included.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondents.*)

Portsmouth Dockyard.

THE event of the month has, of course, been the King's visit to the new Australian flagship, the big battle-cruiser *Australia*, on the deck of which vessel his Majesty knighted Admiral Patey, who will command the Royal Australian Fleet. King George on this visit repeated the incidents of the similar occasion when he came down to see the *New Zealand*, and again exhibited the interest which he is known to take in the principal naval port. Coming after the recent visit of the French Fleet, and followed as it was by a visit from the High Commissioner of Australia and then the mobilisation for manœuvres, Portsmouth is now by way of contrast having a very quiet time. The operation of putting the balance crews on board and getting the ships for the Second and Third Fleets away from harbour was accomplished most smoothly and expeditiously. The following vessels, after being completed to full complement, left on the 15th and 16th July for their respective *rendezvous* with the Red and Blue forces :—Battleships *Bulwark*, *Prince of Wales*, *Irresistible*, *Venerable*, *Albemarle*, *Glory* and *Duncan*; cruisers *Royal Arthur*, *Spartiate*, *Europa*, *Diadem*, *Ariadne*, *Drake*, *Good Hope*, *King Alfred*, *Liverpool* and *Topaze*; and the scouts *Skirmisher* and *Sentinel*, with a number of destroyers. Though several thousands of men were drafted to the ships, there was no hitch in the arrangements, and both in the depots and barracks there are still a number of hands available, showing the result of the recent endeavours to add to the personnel of the Navy. After the Trades and Labour Council had expressed itself in favour of the new compensation scheme, there was little doubt as to the result of the ballot. Out of the five items put forward for readjustment, four were conceded, and with regard to the fifth, the right to appeal, it was hardly expected that the Treasury would admit any other arbiter but themselves. In face of such a reasonable attitude, it is not surprising that the men expressed themselves fairly satisfied, and when the ballot papers were counted on Saturday, 12th July, after being filled in on the previous day, it was found that a majority of over 12,000 were in favour of accepting the scheme. It is not unlikely that the voting at Portsmouth will have considerable influence at the other yards when their turns come to record a decision. After a period of great activity, things have quieted down towards the end of the month. There is still some talk of the launch of the *Queen Elizabeth* taking place earlier than has been usual for dockyard-built ships in order that another vessel may be laid down in the third quarter of the year, and October 10th has been fixed as the provisional date. Several vessels have arrived, the *Isis* for a long refit, the *Melpomene* to pay off, and others. The *Sydney* left on the 17th and the *Australia* on the 21st July, both for Bantry to calibrate before taking their departure for Australia *via* the Cape. While here the two vessels attracted much interest, and quite a number of people visited them.

Devonport Dockyard.

The mobilization on the 15th July, passed off quietly and without any trouble. The number of vessels affected was comparatively small to the numbers at the other yards, and only one ship of the Third Fleet was commissioned, the cruiser *Talbot*. The thousands of men required all knew their places and what was wanted of them, and their behaviour whether of the regular service, the Coastguard, or Reserves, was highly creditable. A larger number than usual were sent off to other ports by train to join their ships. There are still many ratings in the barracks, and if more of the ships of the Third Fleet were wanted in an emergency there would be no difficulty in finding the special ratings for them. The vessels which left the harbour during the two days were the battleships *Exmouth* and *Conqueror*, the battle-cruiser *Indefatigable*, the cruisers *Carnarvon*, *Lancaster*, *Defence*, *Warrior*, *Cornwall*, *Cumberland*, *Devonshire*, *Talbot* and *Sapphire*, the scouts *Adventure* and *Attentive*, the minelayer *Apollo*, and a destroyer flotilla. It has been expected for some time, and indeed ever since it became known that the Engineering School would be used for officers, that another establishment would

be prepared here for training boys. It is now officially announced that the College will be required for the use of officers specialising in engineering, and that the new training establishment for boys will be afloat. It will consist of the *Andromeda*, which is to be renamed the *Powerful II.*, and the *Powerful* herself. Both these vessels have been in hand for some time fitting out, and are to be ready by September. They will be joined together by a bridge, and placed at the moorings occupied for many years by the old gunnery ship *Cambridge*. The boys will use the field at Trevol, which was appropriated for field gun drill and other exercises, as their recreation ground. The College will be reopened about the end of the year, and the alterations which are needed to fit it for the purpose of the officers specialising in engineering will be completed in about eight weeks. There does not appear to be any chance of the dockyard workmen making common cause, and the movement for combined action has died down. A larger feeling of satisfaction appears to prevail, and this has had a good deal to do with the gradual disappearance of agitation since the strike ceased. There are now no restrictions about working overtime, and it is probable that the various classes will deal separately with those matters which still give cause for dissatisfaction. It is again rumoured that when the *Warspite* is launched, probably in November, we shall have a Royal visit, but nothing definite is known on this point. The *Carol*, oil-carrying vessel, was put afloat quietly on 5th July, Mrs. Stokes, the wife of the Admiral Superintendent, performing the ceremony. The *Carol* was laid down in November last, and is a steam driven vessel, but her sister ship, the *Ferol*, which is to be built on the same slip, will have internal combustion engines. This arrangement, since it is understood that in every other respect the two ships will be alike, should enable some interesting comparisons to be made, and some important *data* to be obtained from their respective trials. It is expected that the *Pomone*, sloop, will be refitted here to take the place at Dartmouth of the old *Britannia*, which is to be sold.

Chatham Dockyard.

Owing to the vastly improved organisation in connection with the vessels in reserve there is not now that strain upon the yard when preparations are made for manœuvres that there used to be. The fact is that the ships in the Third Fleet are much more systematically looked after and they are not permitted to fall into an inefficient state, while the ships of the Second Fleet are practically, as they are nominally, commissioned ships. Then again the regulations about repairs since Lord Fisher's time have tended to keep these well under, so that as there is no accumulation of defects to make good, the vessels are ready with very little work. They may require an overhaul, but this is quickly completed. Of course, a large number of ships cannot be placed in full commission without some bustle, but owing to the nucleus crew system, and to the improved organisation in other directions, both the preparation of the ships for manœuvres, and their mobilisation, is accomplished with smoothness and celerity. Although in the eastern port we are less affected in some ways than the other establishments, our output is as large as any, and it is highly satisfactory to know that the way in which the ships were completed with stores, manned, and sent away has received the highest approval. There was every reason to suppose that the new compensation scheme would prove generally acceptable, as soon as it was clear that the authorities were willing to regard the men's suggestions in a sympathetic spirit. When the only alternative offered was to come under the provisions of the Workmen's Compensation Act, the advantages offered by the scheme appealed strongly and made themselves felt. As soon as the Trades Council supported the scheme, it was certain that a ballot would show, as at Portsmouth, a majority in favour of acceptance; the actual figures were 10,836 for acceptance, 335 against. There remains for consideration, the revision of the scale of deductions towards superannuation allowances, when it i hoped that some reduction will be made in the case of the less highly paid classes. The men on the establishment asked some time since that their allowances should be calculated *pro rata* on their full wages instead of on the wages less the deductions, but it seems unlikely that the concession will go as far as this. Directions have been given that all candidates selected for the mechanician class who have less than five years to complete their first continuous service engagement, will be required to re-engage on joining the Mechanical Training Establishment for the course. The *Champion*, the instructional ship for the second-class stokers, is undergoing refit, and in the meantime the *Brilliant* has been appropriated for this duty. The refit of the *Leviathan* and several smaller vessels has absorbed the men which were getting ships ready for the manœuvres, and it is generally felt that Chatham will have all its people employed in earning the money voted for the year.

Sheerness Dockyard.

Naturally the circumstance that the Nore is the principal base of the "Red" Fleet for the manœuvres has made the harbour unusually full of ships this month. There have been more flags flying here this month than we have seen for a twelvemonth, and the hoisting of the Union flag of Admiral of the Fleet, Sir William May, as chief umpire was quite an event. The movements of ships have made the Dockyard quite lively, although the bigger vessels seldom want anything except coal. Some little excitement was caused here when the new boom defence was tested, and much rejoicing took place when it was found to answer all expectations. The operation of putting the component parts in position began on 2nd July, and before mid-day on the following morning everything was completed. The boom is stretched from the Isle of Grain on one side of the river to a little island on which is a martello tower and then in deeper water to Garrison Point, with one section as a gate, which was only closed to traffic for a short time. The whole affair was placed in position most quickly and without much trouble, while it was taken to pieces again and stowed away for future use quite as expeditiously. It must be four or five years since a similar trial of placing this obstruction in the river was made. With the arrival of the *Strenuous* and the *Sturdy* the two new tugs which have been built by Messrs. Thornycroft, this yard will be well equiped in this direction. These vessels are of nearly seven hundred tons displacement and do not draw more than twelve feet of water, while the engines of 1,250 H.P. will drive them at something like twelve knots. But speed is not so much a *desiderata* in these craft as power and staunchness and in this respect nothing was lacking. There are now four fine paddle tugs here, the two above named, and the *Robust* and the *Diligent* of about the same size and power. The *Leda* paid off on the 14th July for an extensive refit, and her place in the North Sea fishery flotilla will be temporarily taken by the destroyer *Wear*, which was commissioned for the purpose on the 17th July. *The Hebe*, *Rother*, and *Ure*, destroyers, have also arrived for refit.

Pembroke Dockyard.

The arrival in the Haven of a Squadron of training ships from Queenstown to fill up their crews, and the advent from other ports of the men, is about the only matter concerning the manœuvres which at the time of writing has affected this place. Of much greater interest to the yardmen is the question, at present unanswered, of the date when replies to their petitions will be received and what shape these will take. Another matter which has been widely discussed here concerns the cause of the explosion in submarine *E5*. An official enquiry took place, but the result has not been published, and although it was proved at the inquest that the mishap was purely accidental, the finding threw little further light on the matter. The general opinion among experts seems to be that the explosion was caused by incomplete combustion in the cylinders leading to leakage into the crank pit. It is good news that the first of our two light cruisers is to be begun this month, as this vessel and the oil-carrier *Turmoil* will take the place of the *Fearless* and the *Nottingham*, both of which vessels are to be completed before the end of the calendar year. The *Fearless* ought to leave before the end of the month to begin her steam trials on the Clyde, while the boilers for the *Nottingham* have already been put in place and delivery of her turbines is expected almost immediately. The destroyer *Thorn* is to come here after the manœuvres for refit and retubing. In the meanwhile a good deal of overtime has been worked in order to expedite some of the business in hand, particularly that of the construction of targets for the Fleet. We are still short-handed and the demand for additional shipwrights has become chronic. Yet to find work for the smiths the steel davits of one of the Portsmouth ships are being made here. The first keel plate of the new cruiser was laid down on July 21st.

SEAMEN'S NATIONAL INSURANCE SOCIETY.

A PAMPHLET has just been issued by the Seamens' National Insurance Society setting forth the scale of payments and the benefits which accrue to those who join the society, which is managed by a committee of twenty-one, composed of seven representatives each from the Board of Trade, from the shipowners and from the insured members. The treasurer of the fund is the Accountant General of the Board of Trade. The master and every member of the crew of every ship in the sea service and in the sea-fishing service, registered in the United Kingdom, and of every British ship registered elsewhere, but whose owner resides or has his principal place of business in the United Kingdom, is entitled to become a member of the society unless :—

A. His rate of remuneration exceeds £160 a year and he is not employed by way of manual labour.

B. He is a foreigner or lascar not domiciled nor having a place of residence in the United Kingdom.

A foreigner or lascar domiciled or having a place of residence in the United Kingdom is entitled to become a member.

The contributions are 4d. per week, to be paid by the member, and 3d. per week by the employer for those engaged in all trades other than the foreign trade, in which the contributions are 4d. per week by members and 2d. by employers. The benefits are 10/- per week for twenty-six weeks, for sickness, and 5/- per week for disablement from termination of sickness till old-age pension commences.

A foreigner or lascar not domiciled nor having a place of residence in the United Kingdom cannot become a member, and he neither pays contributions nor receives benefits ; but his employer will have to pay his own contributions for such men, and these contributions will go to the funds of the society. It is estimated that owing to the contributions received due to non-domiciled foreigners and lascars, there will be an accumulation of funds with which it is proposed to establish a pension scheme and other benefits ; but it is only by joining the society that these benefits can be obtained.

INSTITUTE OF METALS.—On August 28th and 29th the Institute of Metals is to hold at Ghent, the first foreign meeting. The Palais des Fêtes of the Exhibition has been placed at the disposal of the Institute by the Belgian Government. A number of important scientific papers will be read and discussed. Of these probably the most noteworthy is the second report to the Corrosion Committee by Dr. G. D. Bengough, M.A., and Mr. R. Jones, B.Sc., which has been awaited by engineers and metallurgists for upwards of two years. It is expected that the report will clearly indicate not only the causes of the corrosion of condenser tubes, but how such corrosion may be eliminated. If this is so, there should be a resulting saving to shipowners, engineers and others of many thousands of pounds per annum.

ELBE ESTUARY MOTOR LIGHTSHIP.

Interesting Application of Diesel Machinery.

New Opening for "Elbe" Lightship.

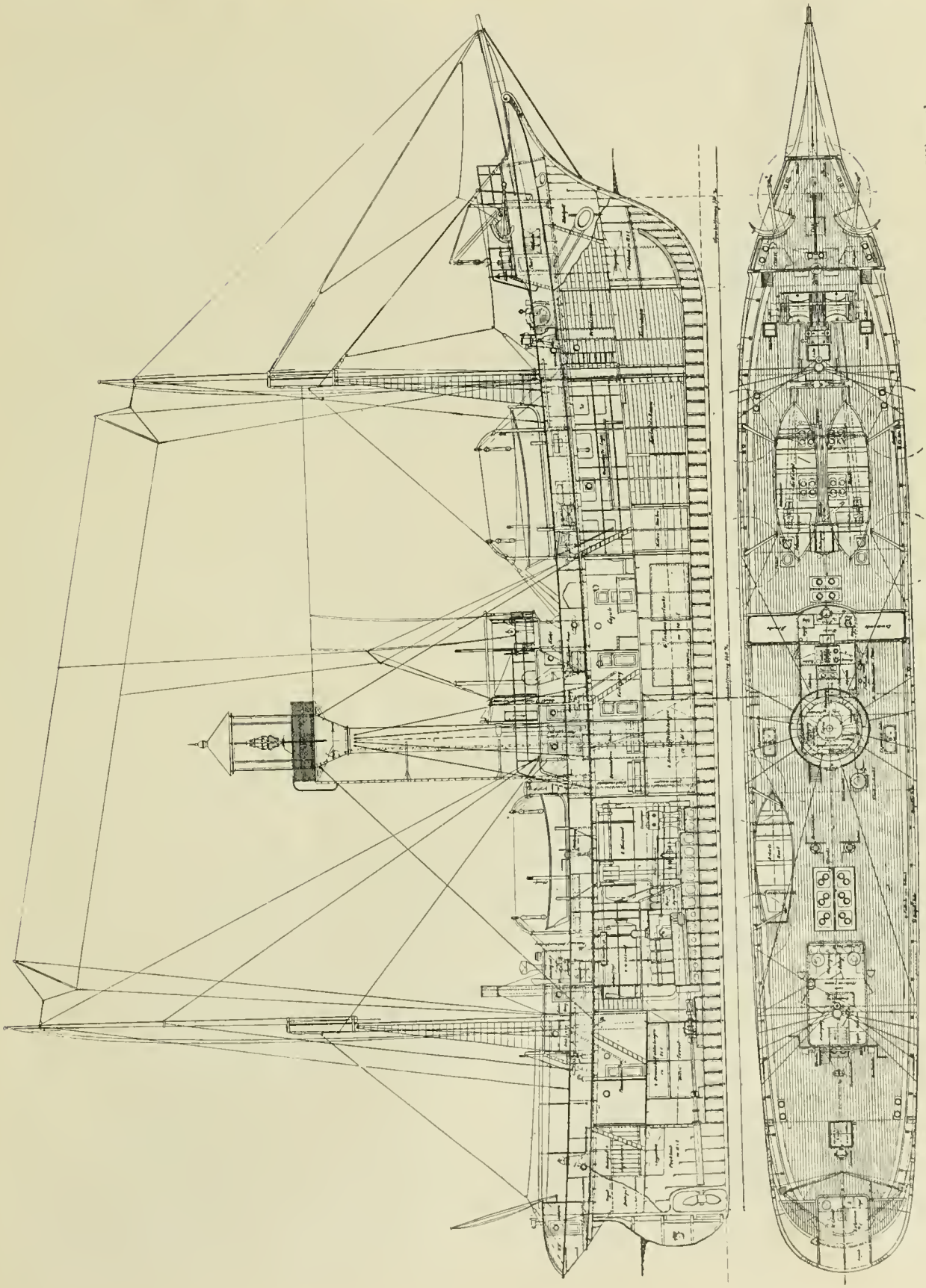
THE Elbe Estuary Motor Lightship, *Burgermeister O'Swald* (Elbe 1) has been built by Messrs. Nüscke and Co. from the designs of Mr. H. E. Johns of Hamburg. With a motor-driven vessel not only are the running costs low, but the main engine is ready to start up in a few minutes in cases of emergency, without heavy stand-by charges, such as a steamship would require to keep a good head of steam night and day. With the motor ship the stand-by and running fuel charges are practically nil in the day-time, in ordinary weather, unless cruising, also sufficient fuel for a long period can be carried without encroaching on the space necessary for the comfort of the crew.

Burgermeister O'Swald is equipped with the latest types of radio-telegraphy, submarine signalling apparatus, beacon-light and fog siren. In addition to Diesel-driven dynamos there are accumulators of large capacity kept charged. Her principal dimensions are as follows :—

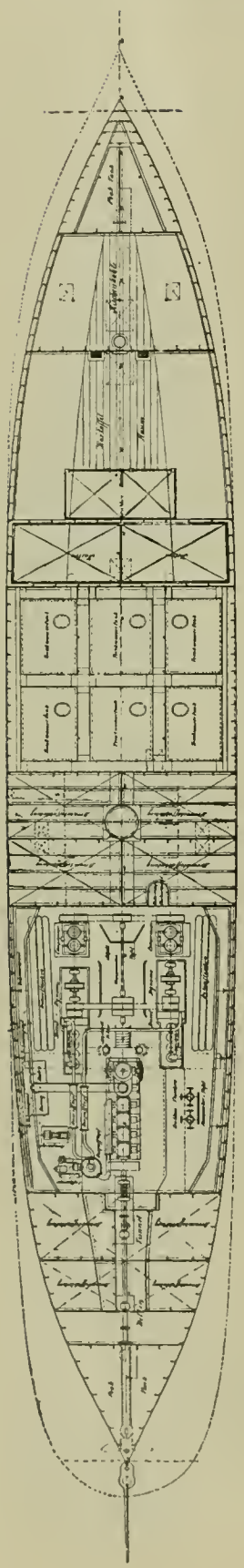
Length overall	173 feet.
Length between P.P.S.	147½ ,,
Beam moulded	25½ ,,
Depth moulded	17½ ,,
Draught	12½ ,,
Height of beacon above W.L.	52 ,,
Displacement	720 tons.
Propelling motor	220 B.H.P.
Speed	9 knots.

There are four Diesel engines, one of 220 h.p., two of 35 h.p., and one of 6 h.p., all of which were built by Sulzer Bros., of Winterthur. The main engine is of the two-stroke type, but the auxiliary motors work on the four-stroke principle. Dealing first with the main engine this is of the single-acting direct reversible class and develops its rated power at 280 r.p.m. Although of the enclosed type it practically becomes

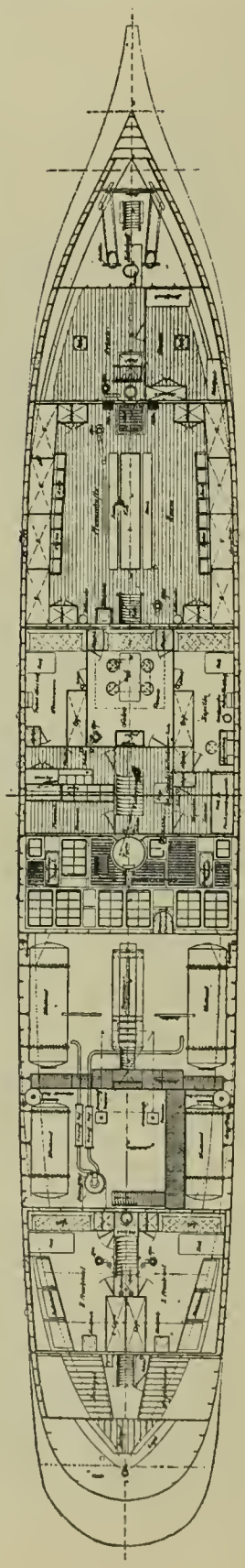
Elbe Motor Lightship, *le Burgermeister O'Swald.*



Section and Deck Plan of the Elbe Estuary Motor Lightship, built by Messrs. Nüscke & Co., Stettin; engines by Messrs. Sulzer Bros., Winterthur.



Engine Room Arrangement



General Arrangement of Elbe Lightship.

an open engine on the removal of the large steel plates on the crank chamber. The cylinders, of which there are four, have their covers directly connected to the bed-plate (D) by means of the steel columns (C), thus the pressures are taken up directly by the bed-plate and main bearings, allowing the cylinders to be free to expand in the direction of their axis. These columns are connected by diagonal ties and the cylinder covers are bolted together, giving a rigid design. In connection with the scavenging and exhaust arrangements, Sulzer Bros., have sensibly adopted the port system leaving only the fuel and starting valves in the cylinder heads. The scavenging air enters the combustion chambers through ports in the cylinder walls, a certain number of the ports being in direct communication with an air chamber, the admission of atmospheric air into which is controlled by valves. The fuel valves are arranged in the centres of the cylinders, while the air-starting valves are located on the sides.

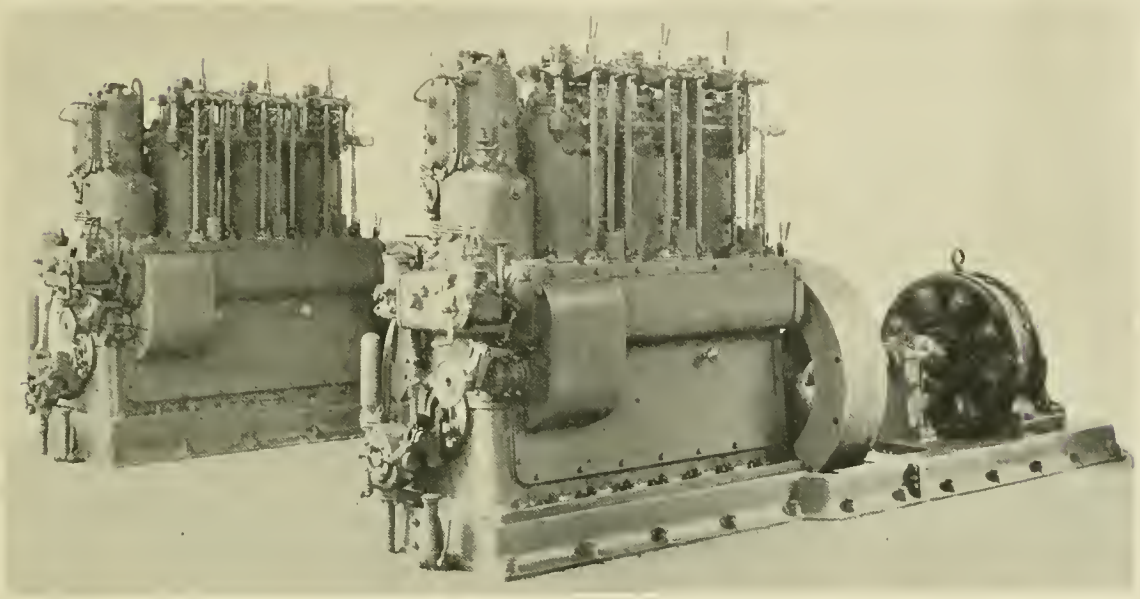
The scavenging pump (E) consists of a double-acting piston-pump controlled by a rotating piston-valve in the casing (F), and the crosshead of this pump is arranged as a first-stage air-compressor, the second and third stages of which are driven by means of balance-levers from the crosshead of the scavenging pump on the port side of the engine. This patented arrangement has proved itself advantageous for high speeds, the various pressures being so evenly distributed that the inertia is nearly completely absorbed, thus giving a smooth drive. In the case of the scavenging pump, water cooling is not necessary, but the three compressor stages, however, are each separately water-jacketed and provided with 'tween coolers. The valve cams are mounted on the horizontal shaft (G), which is driven from the crankshaft through a vertical shaft by helical gearing. The main fuel pumps (J) are also driven from the shaft (G) and are mounted on the compressor jackets at the starboard side of the forward end of the engine.

The reversing and manœuvring control, by means of which the cams are operated for ahead and astern running, is at (K), reversing being attained by revolving the shaft (G) through an angle relative to the crankshaft. Besides this reversing device there is a hand lever arrangement at (L) for throwing the fuel and starting-air respectively in and out of action, the same as is provided in Sulzer stationary practice. This is effected by revolving the lay-shaft (M) on which the rockers for the fuel and starting-air valves are eccentrically mounted. A governor is mounted near the forward end on the shaft (G), which on the slightest increase of revolutions above the normal operates direct on the fuel pump.

All cylinders are provided with forced lubrication supplied by the piston-type pump (N), which is driven by an eccentric on the shaft (G), the oil being supplied from the small reservoir (O) through sight-feed controls. Forced lubrication is also provided for all bearings and gudgeon-pins by a gear-pump placed on the forward end of the engines, the oil passing through a cooler and a filter before reaching the pump. Sea water is used throughout for cooling purposes, the cooling pumps being driven by the main engine. The gear pump mounted on the forward end of the engine is used for cooling the pistons, and the other, a plunger pump seen on the starboard side of the air pump, is for the cooling of the working and compressor cylinders. The latter pump is combined with the bilge pump and both are driven by balance levers from the air pump crosshead. For cooling the pistons the water is led through telescopic pipes, without stuffing-boxes, the water entering the piston in the form of a free jet.

We now come to the auxiliary machinery. The driving engines are of the three-cylinder, four-stroke, non-reversible single-acting type, each giving 35 b.h.p. at 450 r.p.m. With each engine its two-stage compressor is driven direct from the crankshaft while the engine frames are of box-form in two pieces, strengthened internally by columns, and have easily dismountable steel plate doors on each side. The starting, fuel-injection and exhaust valves are placed on the top of the cylinder heads. An adjustable governor is fitted, which regulates the lift of the suction valves of the fuel pump, thus varying the quantity of oil injected. Below the fuel pump may be seen a semi-rotary pump which supplies cooling water for the working cylinders and air compressors.

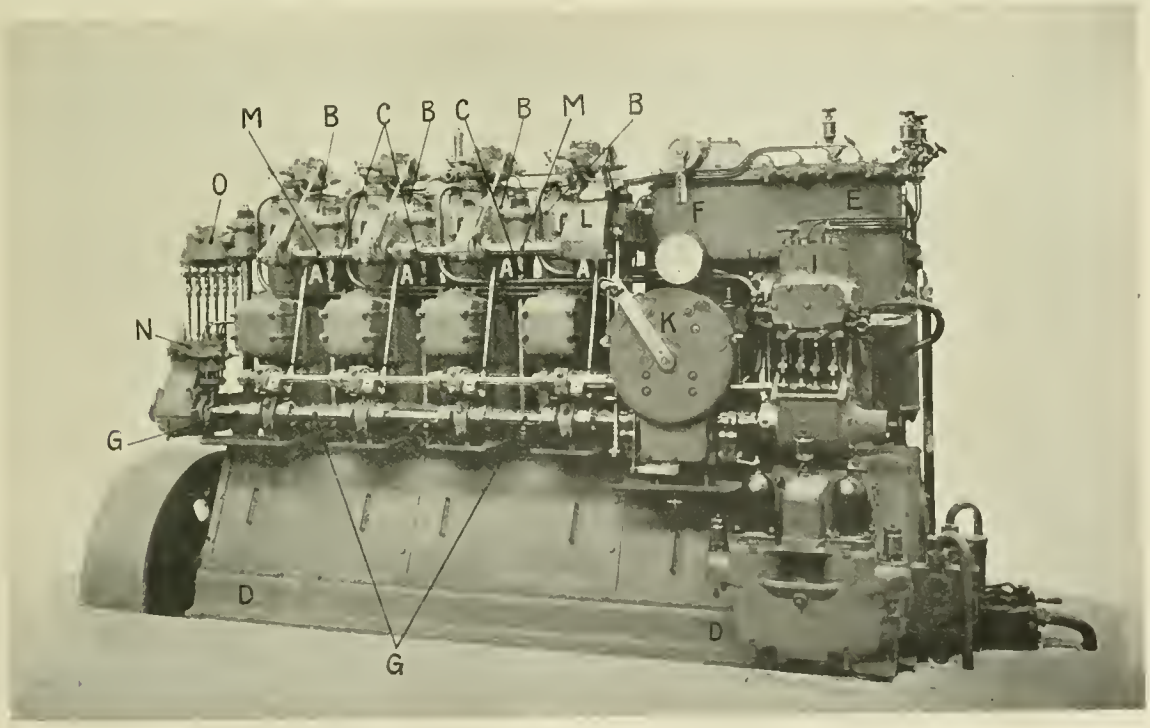
Both these auxiliary motors are direct coupled to continuous current Siemens-Schuckert dynamos. There is also a belt pulley mounted on the crankshaft of each from which is



Auxiliary Machinery of the Elbe Motor Lightship.

driven a countershaft suspended from the engine-room beams. From the other end of this countershaft two low-pressure compressors are driven; these compressors are placed forward of and on the same axis as the auxiliary motors and supply air for the fog siren at a pressure of 2½ atm. The direct-driven compressors of the auxiliary motors provide air at a pressure of 220 lbs. for the purpose of driving the windlass, a duplex general service donkey engine, and the ship's whistle. The various compressed air storage flasks, namely, for starting, fuel-injection, pumping and signalling purposes, are arranged in the port and starboard wings of the engine-room, above the auxiliary sets.

The auxiliary compressor is built V-shaped, the driving cylinder and compressor being set at 90 degrees to each other. There is one single-cylinder Diesel engine of 6 b.h.p. at 600 r.p.m., and the compressor is of the two-stage type. It supplies air for starting and fuel injection purposes, and to work the general service donkey, and has also a small bilge pump directly coupled. Its principal use, however, is as a stand-by in the event of the total failure of the air supply, and although constructed to start on low-pressure air it is large enough to generate sufficient air to start the main 200 h.p. engine in a very short time. The duplex general service donkey pump is of 15 gals. per minute capacity and, as already mentioned, is connected so as to pump the oil and ballast tanks and bilges, and deck washing and for fire service.



Main Engine of the *Burgermeister O'Swald* (Elbe Lightship).

The Story of the Anchor Line.

THE Anchor Line is perhaps the Ocean steamship Company which is most closely associated with the City of Glasgow and with the shipbuilding industry of the Clyde. It differs from the three Companies whose history we have already noted in the fact that it grew out of other interests and did not originate as a steamship-owning business. There was in Glasgow a well-known firm of N. & R. Handyside who entered into the business of shipbrokers and merchants in the year 1838—just about the time when the P. & O. Company and the Royal Mail were preparing to launch their steamship adventures under the auspices of their respective Royal Charters. Messrs. Handyside's business was at that time chiefly connected with the Baltic and Russian ports. But they also seem to have had the management of some small sailing vessels. In the year 1852 they took into partnership a young man, Mr. Thomas Henderson, who had been in command of certain of their vessels during the previous years. They were thus brought into prominent connection with the family which eventually took on their business and became so closely identified with the shipping trade of the Clyde. There were four brothers in the Henderson family, and, coming to Glasgow from the little village of Pittenweem on the coast of Fifeshire, they all took to the sea in early youth and each in turn rose to command as shipmasters. But with the instinct of the sailor they all turned towards the chance of a shore job. Thomas, as we have seen, found his billet in the office of Messrs. N. & R. Handyside. David, the eldest of the quartette, in conjunction with William the youngest of the family, set up a marine engineering establishment which flourishes to this day under the style of D. & W. Henderson, and the remaining brother John soon joined the Handyside business, first as master and then as partner. It was in 1852 that the Anchor flag and designation were adopted by that firm, which soon became a shipping business pure and simple. Mr. Nicol Handyside left the firm and took with him the mercantile department and its connection. The next year Messrs. Handyside & Henderson acquired a vessel of 844 tons register, the *Tempest*, and placed her under the command of Captain John Henderson. The *Tempest*, after at least one voyage to Bombay, was put into the St. Lawrence trade, and commencing in 1854, there sailed with her the *John Bell*, owned by a merchant of that name, who placed her for management with the owners of the *Tempest*. This year 1854 was a crucial date in the history of the Anchor Line, for in it they opened their steamship line between Glasgow and Lisbon with the screw steamships *Vasco da Gama* and *Ignez de Castro*, of which they held the management on behalf of the owners, the Glasgow and Lisbon Steam Packet Company, of which Mr. William Ewing was chairman. The *Vasco da Gama* was of but 178 tons register. But a little later the firm acquired two larger vessels, the *Dream* and the *Vision* of upwards of 420 tons each. These were chiefly employed in the trade round the Horn to Valparaiso. The Lisbon branch of the trade soon expanded into the Mediterranean, touching at Sicilian ports as well as those of Spain. For the expansion of this service three more vessels were acquired. These were the *Dom Affonso*, the *Dom Pedro* and the *Dalhousie* of about

Caledonia (I.), 1862 Length, 259 ft.; breadth, 33 ft.; depth, 21 ft.

and had remained at home till the success of their pioneers was assured. In 1862 a larger vessel than any as yet provided for the fleet was launched in the *Caledonia*, first of that name, a vessel which, after a short career, was lost at Cape Cod. But the next year a still larger *Caledonia* and a *Britannia* came out. These vessels were upwards of 2,000 tons gross register, and they had accommodation for over 600 passengers, of whom some sixty were carried in the first cabin. High speed was not a desideratum for this traffic at that time, and a sea speed of 10½ knots seems to have been quite sufficient for these ships. Events were moving rapidly now, and in 1864 a fortnightly service from Glasgow to Algiers, Tunis, Malta and Alexandria was established. This line developed, and for a time maintained a great pilgrim trade, the devout Musselmans being shipped at Algiers for conveyance to Alexandria, whence they proceeded on foot to their goal at Mecca. Then there was work in connection with the construction of the Suez Canal, both in the way of carrying material needed in the development of Alexandria, and in transporting Greek labourers who had been engaged in the work of cutting the isthmus. But the New York trade also was going ahead. In 1865 the addition of new steamers and the increase of the traffic, both in passengers and goods, encouraged the inauguration of the weekly service. This departure was justified by events, and in 1867 a call at Moville for the convenience of the Irish emigrants was instituted. The expansion of the Mediterranean trade had now made it desirable for the Company to maintain no less than three separate lines from Glasgow to various parts of the Mediterranean, and even before the opening of the Suez Canal facilities had been provided for the shipment of goods by the Company's steamers to Alexandria, whence, by arrangement with the P. & O. Company, they could be forwarded to the Far East. Liverpool, too, had its Anchor service to the Mediterranean. The opening of the Canal thus found the Anchor Line ready to avail itself of its opportunities, and indeed, it may be recorded that one of the Company's steamships, the little *Dido*, was actually the first British mercantile steamship to enter the now historic waterway. The Scandinavian traffic was a great factor in filling the steerages of the Atlantic steamers of the line, but complaints were made as to the want of satisfactory communication across the North Sea, and so this same year a North Sea service was instituted. One vessel was detailed to make a weekly sailing from Gothenburg to Granton, whilst another brought intending passengers to the same port from the Norwegian ports of Christiania and Christiansand. From Granton the emigrants were forwarded by rail to join the New York steamers at Glasgow. It was in 1870 that the Anchor Line instituted its service from Italian ports—where, of course, the flag had long been known in connection with the calls of the Glasgow steamers—to New York. This was the first of the many services now maintained on this route by British steamships. It was called into being by the expansion of the American railroad system and the scarcity of suitable labour for the heavy work which the navvy has to undertake. The success of the Company was now so great that in 1871 they were assailed by a rival in the Clyde to New York trade. This was the State Line, which, after twenty years' unsuccessful competition, was taken over by the Allan Line, its service being finally abandoned in 1903. The extent of the passenger trade enjoyed by the Anchor steamers of those days may be gauged by the fact that in 1872 their then new steamship *California*—not, of course, the magnificent twin-screw ship which graces the fleet of to-day—brought home the largest number of saloon passengers ever brought in a single steam-

Furnessia, 1880. Length, 445 ft.; breadth, 44 ft.; depth, 34 ft.

City of Rome, 1882. Length, 560 ft.; breadth 52 ft.; depth, 37 ft
(The largest ship of her day.)

ship. The number was 178 persons. In 1872 the Meadowside yard, where many of the hulls of the Company's steamers had been built by Messrs. Tod and MacGregor, was acquired by Messrs. D. & W. Henderson, the firm of Handyside & Henderson taking a financial interest in the purchase. Thus it came about that from that date onwards the firm of D. & W. Henderson, who had previously only built engines for the Anchor liners, began to construct the hulls of the greater number of the new vessels which were being so constantly added to the fleet. The day of huge combinations and big fleets had not yet dawned, and the 47,169 tons which the twenty four steamers of the Anchor Line totalled in 1872 made them one of the biggest companies under the red ensign. Two of their vessels, the *California* and the *Victoria*, were each of 3,410 tons.

The early seventies saw two important developments. One was the natural result of the opening of the Suez Canal, which enabled the Company to extend its own services direct to India. The other was the connection with Barrow-in-Furness. The Duke of Devonshire of that day, and others interested in the Furness district, intended to turn Barrow into a great port. They built deep-water docks. They established the shipbuilding yard and they started the Barrow Shipping Company with a fine fleet of steamers. But the steamers were finished before the port was ready for them, and so it was arranged that they should sail in the Anchor services—an arrangement which suited Messrs. Henderson, who found their own fleet hardly big enough for the work it had to do. It was this connection which brought the *City of Rome*, largest and most graceful ship of her day, into their management after she had been refused by the Inman line, for whom she had been built. Under their auspices she sailed for some seasons between Liverpool, and New York in conjunction, at different times, with the Orient Liner *Austral*, the National Company's *America* and the *Furnessia* of the Anchor Line. Eventually the *City of Rome* and the other remaining ships of the Barrow Company were actually absorbed by the managers. The *City of Rome* now sailing from the Clyde, helped to establish that magnificent service of first-class passenger steamships which now carries the Anchor flag between the Clyde and New York. Developments came more quickly as the years went on and it is impossible to chronicle all the events which occurred. But it was in 1882 that the direct Calcutta service was established and in 1885 that the call at Marseilles for the convenience of Bombay passengers was arranged. In 1895 Manchester became one of the ports served by the Anchor steamers. In the year 1899 the great step was taken by the management. The old firm of Henderson Brothers ceased to exist by the retirement of the then partners, the fleet being taken over by the present limited liability company. At the same time the interest in the Meadowside Shipbuilding and the Finnieston Engineering Works, which the firm had held for so long, was sold, the new directorate being desirous to confine their attention to shipowning. This year saw the commencement of the South African war, and for trooping purposes the Anchor line chartered some half-dozen of its fleet to the Government. The new management at once turned its attention to the improvement of the vessels engaged in their various passenger trades. New and larger vessels were at once ordered for the Bombay, Calcutta and New York services, the latter including both those from the Clyde and from the Mediterranean. The *Columbia*, first of the four twin-screw steamers which now maintain the weekly service across the Atlantic, was of 500 feet in length with accommodation for between 1,300 and 1,400 passengers, of whom 220 were carried in the saloon. Her speed was 16½

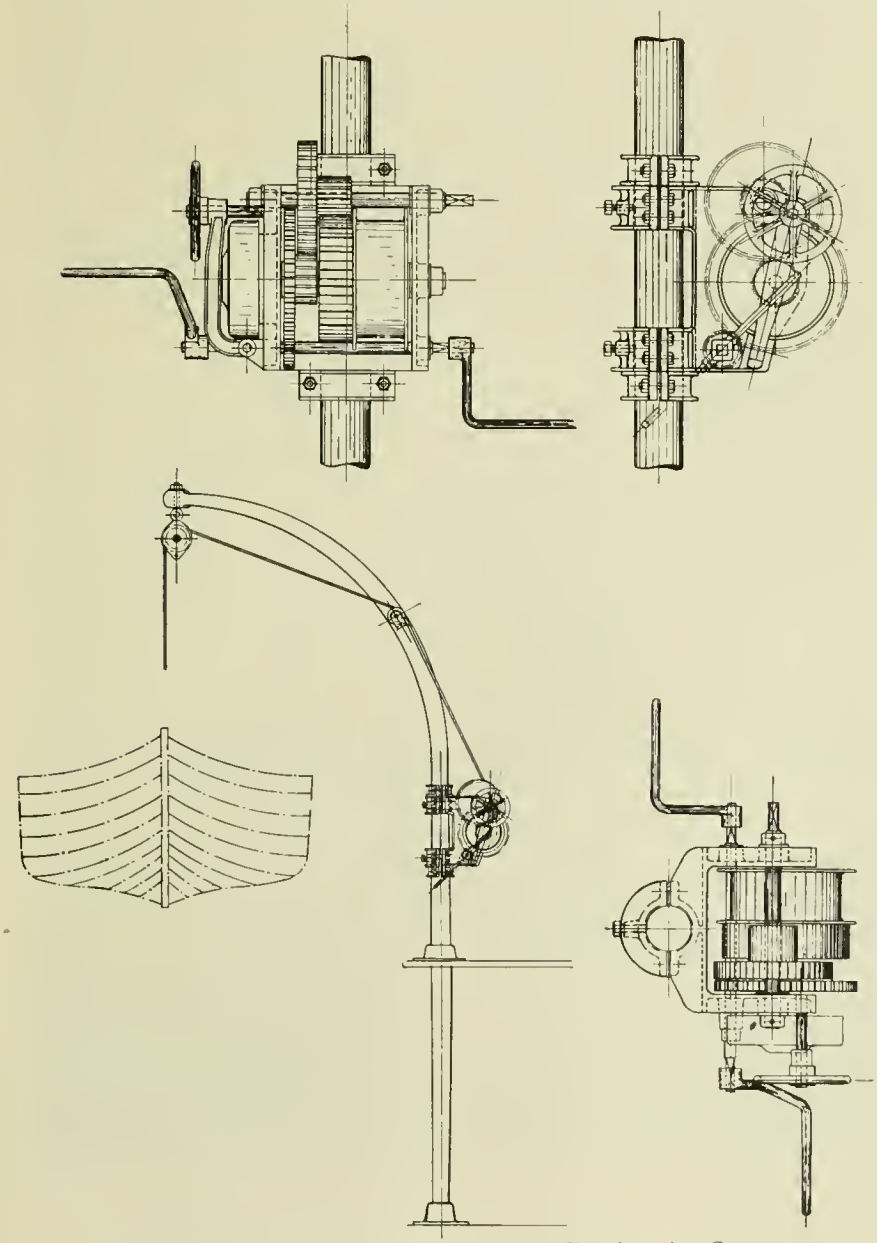
lowering of the boat; the winding gear must be so adjustable that the trim of the boat can be varied according to whether the vessel is down by the head or stern, in order for the boat to take the water on an even keel, and lastly, a quick-return geared hand-winch should be used for hoisting purposes.

We illustrate, in the adjoining diagrams, the Colgrave Patent Rapid Boat-lowering Gear which, it is claimed, not only complies with the requirements indicated, but actually anticipated them.

It will be seen from the diagrams that the arrangement permits of the use of a single-wire rope fall, which is coiled upon a winch of special construction, adapted to be fitted to and supported on existing davits, and capable of lowering a full boat load in a few seconds, under absolute control. The arrangement entirely overcomes the difficulties with the usual system of hemp ropes, blocks and tackle, owing to the tackle blocks twisting and the tackle binding, and at the same time avoids the use of a long length of tackle rope lying about the boat deck, and becoming a serious encumbrance.

A winch is fitted on each davit, and both winches have to be brought into play in handling one boat. One man is required at each winch for lowering operations. Two men at each winch enable a boat to be raised rapidly from the water. If it is necessary to turn the winches inboard, this can be readily done by slacking back the jamming screw in each supporting collar, and turning the winch upon the davit itself, in which latter position it can again be secured by the jamming screw.

This gear, which is being put on the market by Messrs. Bullivant & Company, Ltd., of 72, Mark Lane, London, E.C., has been thoroughly tested both in port and at sea.



Detailed Drawing of Colegrave's Patent Boat-lowering Gear.

Binding Parts.—The Publishers undertake the binding of readers' parts at 2/6 per volume, in cloth.

Mr. James A. Smith, naval architect and surveyor, has received an order to design a 40-feet sea-going motor yacht for a Belgian owner.

The Late Sir Alfred Jones.—On the 5th of July, before a large gathering of influential people, Lord Derby unveiled a memorial to the late Sir Alfred Jones, which has been erected at the Pier Head, Liverpool.

International Engineering Congress, 1915.—In connection with the Panama-Pacific International Exposition, which will be held in San Francisco in 1915, there will be an International Engineering Congress, in which engineers throughout the world will be invited to participate. The Congress is to be conducted under the auspices of the following five National Engineering Societies: — American Society of Civil Engineers, American Institute of Mining Engineers, The American Society of Mechanical Engineers, American Institute of Electrical Engineers and The Society of Naval Architects and Marine Engineers. These Societies, acting in co-operation, have appointed a permanent Committee of Management, consisting of the Presidents and Secretaries of each of these Societies, and eighteen members resident in San Francisco. The Offices of the Committee are at Foxcroft Building, 68, Post Street, San Francisco, and Prof. Wm. F. Durand is Chairman, and Mr. W. A. Cattell, Secretary-Treasurer. The papers presented at the Congress will be divided into groups or sections, and during the Congress each section will hold independent sessions. It is hoped to make the Congress widely representative of the best engineering practice throughout the world, and the papers, which will be collected and published by the Congress, should form an invaluable engineering library, and it is intended that this publication shall be in such form and at such cost as to become available to the greatest possible number.

MARINE MOTOR NOTES.

THE transport of goods from the factory to the centre of distribution, and also the carriage of raw material to the manufacturing districts, are important points for the consideration of those immediately concerned. They are only a degree less important to the consumer, in that the cost of transit affects, to some extent, his purchasing power. In territories far removed from the sea-coast, where roads have not been formed, as these are understood to be in civilized countries, and where waterways are not available, the passage of goods is a matter of serious moment, and the proposal to form a macadamized highway through Africa to facilitate the transport of produce is one which would, if carried into effect, be a great boon and further the opening up of the country. The Scottish Motor Shipping Co. gave due consideration to the cost of transit within the coasting limits, when it was determined to adopt the oil engine in preference to steam as the motive power for the fleet of vessels being added to from time to time, as noted in the monthly list of launches and trial trips. One of these coasters was chartered recently to convey a cargo from the Clyde to the South of England and another is being negociated for to take a similar cargo. The running costs admit of giving more favourable terms for the conveyance of a cargo suitable for the limits of the vessels. The barges usually seen about the London docks are moved by hand labour and a chance favouring breeze, invited by ingenious erections of boxes and other objects, much after the methods of primitive ages, when skins were used to court the winds and assist the rowers in their efforts to press on from place to place. The passing of such barges where bridges require to be swung, is a tedious process and involves a great hardship upon the waiting traffic, causing loss of time and its commercial equivalent to both employers and employees, and protests have been lodged and petitions signed, with a view to remedy this state of matters. The grants made to enable fishermen to take advantage of motor power have been productive of good, and in many cases recently cited the boats fitted with motors have done very well, due to their ability to move further afield and use better despatch, also in following the fish beyond the waters in the immediate vicinity of the home harbour, perhaps to the relief of the line fisherman, who desires that the more timid fish may fall a prey to his tempting bait, the disturbing influences of the motor being removed. For auxiliary purposes the oil motor is finding extended service month by month, its adoption for some of the boats on passenger steamers is obviously an advantage, and when the wind is contrary, or sojourning elsewhere, the motor in reserve is valuable to the yachtsman. The contract entered into by the Admiralty for the supply of fuel oil may have a beneficial effect on the market prices. The output of shale oil per annum is about 250,000 tons, but the estimate given of the full capacity was nearly double this quantity, and available for more than a century at that output. Enquiries are being made for barges to be propelled by oil motors, both for River and Coastal Services, the former being about 80 feet long and the latter about 130 feet. The oil engines to be approximately 30 and 280 i.h.p. for speeds of five and nine knots respectively

THE KING'S VISIT TO LIVERPOOL.

WHILE the guests of Lord Derby, at Knowsley, their Majesties paid a visit to Liverpool, on July 11th, and during the day performed several important functions in connection with the city's mercantile and industrial interests.

At 11-20 a.m., arriving at the main entrance to the Liverpool Exhibition, the Lord Mayor and Lady Mayoress were presented by Lord Derby. A tour was made of the main portions of the Exhibition; while in the Music Court, 5,000 children gave a vocal rendering of Elgar's "Land of Hope and Glory." Many special stands were erected in the grounds, while the many fine buildings were tastefully decorated.

After a visit to St. George's Hall, and later, luncheon at the Town Hall, their Majesties left the landing-stage at 2-30, on board the Dock Board tender, *Galatea*, when a tour of the merchant vessels was made. These included two cruisers, *H.M.S. Lancaster* and *Liverpool*; the *Mauretania*, *Ceramic*, *Carmania*, *Ascanias*, *Empress of Ireland*; the dredger, *Leviathan*; pilot boat, *Alfred H. Reid*, and the training ship, *Jas. J. Bibby*; also the cadet ship, *Mersey*, and others, in all twenty-six vessels. Their Majesties boarded the *Mauretania*, where a Guard of Honour of the boys from the *Indefatigable* was mounted. Cadet Raymond Raffell, of the *Conway*, was presented by the King with the medal, to be given to the best cadet.

At 4-30, the *Galatea* entered the Gladstone Dock, which was then declared formally opened. This dock is the largest in the world, being 1,050 ft. long and 120 ft. wide, with 46 ft. of water on the sill at high water.

As mentioned in the April, 1912, issue of this journal, the Gladstone dock may be used as a graving dock when required, and a powerful pumping plant has been installed, by means of which the 7,000,000 cubic feet of water, which the dock contains when full, can be emptied in two-and-a-half hours.

During the visit, Mr. Robert Gladstone, the late chairman, Mr. Helenus Robertson, Mr. Chandler, secretary, and others, were presented to the King, and a Knighthood was conferred upon Mr. Robertson and Mr. Harmood Banner, M.P., Lord Mayor.

FOREIGN NOTES.

Austria.

THE s.s. *Drava* was launched on July 21st, at Lussinpiccolo from the yard of Messrs. Martinolich. The vessel is a small passenger and cargo steamer for the coasting trade between Fiume and Dalmatia and is owned by the Ungaro-Croata, Fiume. The dimensions are 140′ by 20′ by 12′.

On July 21st, the *S.S. Numidia* had her official trial trip, though private trials were run a week before. Particulars of the vessel were given in last month's notes. The triple-expansion machinery has been built by Messrs. The North Eastern Marine Eng. Co., Ltd., of Wallsend. At private trials the vessel attained a speed of 11¾ knots in ballast

France.

The *Sainte-Marguerite* has been successfully launched at the Chantiers de France, where she has been built to the order of a Marseilles shipping company. The displacement is 6,000 tons and triple-expansion engine develops 1,400 I.H.P. The designed speed is 10·5 knots.

Germany.

At Hamburg, the Shipbuilding Testing Works have just been established with a capital of 100,000 marks. All the shares have been taken up by the leading shipyards of Hamburg, Bremen, Keil, etc. The new establishment has for its object the erection of a plant for experimenting with ship models, etc. In order to enable this undertaking to be carried on in an efficient manner the Senate of Hamburg is to be asked to place a suitable site at the disposal of the new company and to contribute the sum of 1¼ million marks for the erection and installation of the machinery and buildings.

The University of Göttingen is instituting a chair for hydro and aerodynamics specially intended for students of aerial engineering.

The *Kiowa*, of 7,000 tons, has just been launched at the Howaldt shipyard, where she has been built to the order of the German-American Petroleum Co. The Stocks & Kolbe shipyard has received the following orders: A seagoing tugboat of 400 I.H.P. for Monte-video, engined with a Diesel motor, a lighter of 150 tons for the Congo, a twin-screw tug boat of 80 i.h.p. for Siberia, two motor launches for West

Africa, a motor vessel of 300 i.h.p. for Lisbon, a three-masted schooner with auxiliary engine of 75 i.h.p. for Brazil. In addition various orders have been received for lighters of 100 and 250 tons, two cruising yachts, three tug boats and a petroleum tank motor craft of 500 tons.

The *Madeleine Rickmers* has recently been launched at the Rickmer shipyard at Hamburg. The dimensions of the vessel are: Length 109·7 m., beam 15·3 m., and the carrying capacity is 6,000 tons. Her speed will be 11 knots. Cabin accommodation has been provided for 30 passengers.

At the shipyard of Messrs. Blohm & Voss, the third sister ship of the *Imperator* is in course of construction and its completion is being rapidly proceeded with.

The Woerman Steamship Co. has placed an order for a twin-screw passenger and cargo steamer of 1,000 tons with the Reiherstieg shipyard. This new vessel is to do duty on the African service.

The Cuxhaven High-sea Fishing Co. has placed orders for four fishing steamers with the Unterweser shipyard. Their length is to be 38·5 m., beam 7·5 m., and their propelling machinery will consist of compound engines of 400 i.h.p.

The tank motor vessel *Ilotan* has recently been launched at the Reiherstieg shipyard, where she has been built to the order of the German-American Petroleum Co. She will be provided with a two-cycle oil motor, of 2,000 h.p. Her carrying capacity is 7,500 tons. The vessel has been constructed on the longitudinal frame system.

At the Northsea shipyard at Emden, orders have been placed for two large floating crane-pontoons for the Panama Canal, and a large tank motor vessel of 7,300 tons for the German Petroleum Company.

The shipyard of Jansen & Schmilinsky has received an order from a Hamburg Tug-boat Company for a sea-going tug and salvage steamer. The vessel is to be equipped with an engine of 700 i.h.p. and with very powerful pumps. The steamer *Java* has been successfully launched at the shipyard of the Bremer Vulkan at Vegesack where she has been built to the order of the German-Australian Steamship Company, Hamburg. She is a cargo steamer of 12,300 tons carrying capacity, her length being 153 m. and beam 16 m. A quadruple-expansion engine of 5000 i.h.p. will give the *Java* a speed of 13½ knots. At the shipyard of Messrs. Blohm & Voss the second section of the floating dock for the German Admiralty has been successfully launched. The complete dock will have a lifting capacity of 40,000 tons.

The *Pommern*, which was built at the shipyard of Bremer Vulkan at Vegesack to the order of the North German Lloyd, was recently put through her trial-runs very successfully, the vessel attaining a speed of 12½ knots. The propelling machinery of the *Pommern* consists of a triple-expansion engine of 4,800 i.h.p. and her length is 14·9 m, beam 17·9 m., and her carrying capacity 11,000 tons on a draught of about 8·15 m. There are nineteen winches and twenty derricks for dealing with the cargo on board. The same shipyard has five further steamers for the North German Lloyd in course of construction.

Russia.

The Admiralty is at present engaged on the plans of a large type of submarine of 5,400 tons, the length being 132 m., beam 10·5 m. and depth 9·5 m. The vessel will be provided with two Diesel motors aggregating 18,000 I.H.P. The surface speed is to be 26 knots. It will be equipped with thirty torpedo tubes and five quick-firing guns of 14 cm.

Holland.

The floating dry dock of 14,000 tons has been successfully launched at Amsterdam.

Spain.

The battleship *Alfonso* 13, of 15,700 tons displacement, has been successfully launched at Ferrol. She is to be ready for service early in 1915. A further ship of this type, the *Jaime I.*, is still on the stocks and is also shortly to be launched.

Italy.

Five of the submarine boats which have been constructed at Spezia and Livorno have now been placed on active service list. They have a displacement when submerged of 300 tons. On trial they attained a speed of 14 knots above water. In the course of this summer four further boats will be ready for service. These have a displacement of 400 tons and a speed above water of 18 knots and under water of 14 knots. Their motor-equipment will consist of Diesel motors of 1,500 h.p.

The plans of the four large battleships have now been definitely settled. The displacement of each is to be 26,000 tons, and the speed 25 knots. The two new super-Dread-

The Palace of Machinery and Electricity—250 feet long by 70 feet wide—one of the principal buildings in the Liverpool Exhibition, now open. In our July issue a description of a number of the exhibits was given. The Exhibition, which is a very successful one, was visited by the King on July 11th.

noughts which are to be called *Italia* and *Dandolo* will have a displacement of 30,000 to 31,000 tons, and their speed is to be 25 knots.

Denmark.

The motor vessel *Pedra Christophersen*, of 6,500 tons, has been launched at the Burmeister & Wain shipyard at Copenhagen, where she has been built to the order of the Nordsteirnan Steamship Co. Her motors develop 2,000 i.h.p. She will serve on the South American line.

GREENFIELD'S BOAT-LOWERING GEAR.

A REMARKABLY efficient solution of the requirements of the modern leviathan and also the Board of Trade, is found in Greenfield's Boat Gear, a large-size model of which is now on view in the machinery hall at the Liverpool Exhibition.

This Gear embodies practically every feature demanded by recent events and legislation.

The boats are nested upon a platform movable outboard on either side of ship, and also capable of being inclined to suit any angle of list. This platform is supported above the deck, thus allowing full unobstructed deck space. The boats can be loaded either before moving or at any other deck level desired, and are travelled outboard by means of stretching screws, which run in overhead guidings. These screws pass into a special releasing gear attached to supports, which then swing further outboard; the boats can then be lowered to the water level, and released instantaneously at both points of suspension. The points of suspension, being at intermediate positions along the boat's length, instead of at each end, allow the boats to be fully loaded without strain. Suitable gear is arranged to perform all the operations, these requiring only three men and officer, thus leaving the majority of crew available for manning. The relative position of the lowering pulleys to one another can be adjusted for any trim, these pulleys being grooved to prevent the wire rope fouling.

Mr. W. J. Greenfield is a master mariner, and having had thirty-five years' experience, has embodied in his gear the mature ideas of a lifetime. For seven years Mr. Greenfield was connected with the New Zealand Lighthouse Supply Service, the handling of small boats being a constant feature of this service. The invention is patented in every maritime country, and applications for fitting the gear should be addressed to Capt. Greenfield, 12, The Quay, Waterford, Ireland. The formation of a company is under consideration, or the rights would be disposed of.

Institute of Marine Engineers.—We have received intimation from the city premises committee of the Institute of Marine Engineers to the effect that the negotiations for acquiring ground on a 99 years' lease have been completed. The plans for the building have been passed and a contract accepted for erecting the new premises. The site is on Tower Hill, near the Mint, where the Minories open out towards the Tower Bridge. The old buildings on the site are being demolished and the ground cleared for the foundation, and it is expected that the premises will be completed and ready for occupation in the spring of 1914. The contributions to the building fund have reached £6,026, but as the total amount required is £12,000, at least, members and friends are desired to do all they can to further the aims of the committee towards reaching the total before the building is completed. We hope to be in a position to illustrate the plan and elevation of the premises in our next issue.

MR. EDWIN BERRY.

THE retirement of a prominent official from active service is always an interesting event to those who have been associated with him, either in a business capacity or in social life, and there are many of our readers who, in one or other of these ways, have known the superintending engineer of the Ocean Steamship Co., Ltd., and of the China Mutual Steam Navigation Co., who has retired from that position after about fifteen years service. Prior to occupying the position in question, Mr. Berry was one of the Board of Trade Surveyors in the London District.

The occasion of his retirement, at the end of June, was taken advantage of by the engineering staffs of the two companies to show the esteem in which he was held, and to mark the appreciation of those who had been associated with him in carrying on the work of the engine department at sea and in port. A dinner was given in the Masonic Hall, Birkenhead, on June 25th, when a gold watch, chain and seal were presented to Mr. Berry from the engineers and engineering staff, also a silver rose bowl and four silver flower vases from friends, while to Mrs. Berry a diamond pendant was presented. There was a good attendance of engineers and friends, presided over by Mr. J. W. Winter, chief engineer s.s. *Theseus*, who also made the presentation on behalf of the engineers who had subscribed to show their regard for Mr. Berry. Mr. Geo. Turnbull presented the gifts from friends who desired in this way to manifest their respect for Mr. and Mrs. Berry and in memory of their pleasant intercourse.

Mr. Berry, who received an ovation on rising to respond, acknowledged the gifts and reciprocated the good wishes extended to himself and Mrs. Berry. Their connection with the Company had been very pleasant and the work had always been carried out with good spirit.

The toast of "The Ocean Steamship Co., and the China Mutual Steam Navigation Co.," was submitted by Mr. Douglas and responded to by Mr. N. B. Wortley, director, Messrs. Alfred Holt & Co., who gave a most interesting account of the early days, when the line was started by Mr. Alfred Holt, leading up to the latest developments. He expressed the hope that Mr. Berry, in his retirement, would long enjoy the leisure he had so well earned. Mr. Berry

received a handsome cheque from the firm as a token of their appreciation of his services.

During the evening special references were made to the sympathy extended by Mr. Berry towards the junior engineers, shown by his willingness to advise and help them when any difficulty or trouble arose in the course of their service. It is doubtless a great source of gratification to Mr. Berry on his retirement to know that his friendly acts have been appreciated by all who served under him.

ENGINEER-CAPTAIN WILLIAM ONYON, R.N., M.V.O.

The retirement from official service in the British Navy of Engineer-Captain William Onyon, R.N., M.V.O., and his joining the engineering staff of Messrs. William Beardmore and Co., Ltd., Dalmuir, are facts of interest recently announced. Although yet in the prime of life Captain Onyon has occupied highly important positions in the Navy, especially in connection with new construction, and is well known in construction centres particularly on the Clyde, where, now, his exceptional abilities and ripe experience are to be exclusively requisitioned. He was born at Belvedere, Kent, in 1862 and received his education and early training at Christ's Hospital, on board H.M.S. *Marlborough*, and at the Royal Naval College, Greenwich.

On leaving the Naval College in 1885 he was appointed to H.M.S. *Monarch*, Channel Fleet, then to H.M.S. *Ajax* for a three months' cruise, and in December, 1886, to H.M.S. *Alexandria*, flagship of the Duke of Edinburgh, in the Mediterranean. After one year in her he was drafted to the H.M.S. *Agamemnon* in which he remained three and a half years, the vessel for most of the time being employed blockading the East Coast of Africa and in suppressing the slave trade on the Zanzibar Coast. Returning to England at the end of 1890 he was appointed to the Admiralty for six months' service in the drawing office, on completing which and a short period on H.M.S. *Iris* in manœuvres, he proceeded in 1891 to Malta to take charge of hull and machinery of the torpedo boats in reserve, and for instructional purposes. At the end of 1894 Mr. Onyon returned again to England and was appointed to H.M.S. *Dashir*, destroyer, building at Messrs. Yarrow's, Poplar, and afterwards to the sister ship *Hasty*. Both these vessels, it may be recalled, had the locomotive type of boiler, which gave much trouble, and were afterwards re-boilered with water-tube boilers at Messrs. Earle's, Hull. After serving three years on these two vessels in the Southern Command, he was, in November 1898, appointed Chief Engineer of Jamaica Dockyard and occupied this post three years, holding also the appointments of Surveying Engineer of Emigrant Ships, Examiner of Engineers in Coasting Trade, and Adviser to the Royal Engineers at Kingston and Port Royal On returning to England at the beginning of 1902 he received the thanks, in writing, of the Governor—Sir Augustus Hemming—for services to the Jamaican Government. After a short period of service on H.M.S. *Excellent* and *Vernon*, for hydraulic and torpedo courses, Mr. Onyon was in July, 1902, appointed Engineer Overseer on the Clyde. In this capacity, it is worthy of note, he was Overseer for the first two vessels ever completed at contractors' works for the British Navy, *viz.* H.M.S. *Donegal*, at Fairfield's and *Berwick* at Messrs. Beardmore & Co., Govan. Previous to this, naval vessels had always been sent to the Royal Dock Yards to be completed and for trials. In July 1905, Mr. Onyon was appointed Engineer-Commander of H.M.S. *Dreadnought* and Overseer for the turbine machinery, building at Messrs. Parsons' Turbinia Works, Newcastle-on-Tyne. He remained Engineer-Commander of the *Dreadnought* until December, 1908, when he was appointed to the Controller's Department (Engineer-in-Chief's branch), serving until October, 1911. In June, 1911, having previously received their Lordships' appreciation in writing, with the promise of special promotion, he was promoted to the rank of Engineer-Captain for special services in connection with the construction and management of the *Dreadnought's* machinery. He was selected by Admiral Sir Colin Keppel, K.C.V.O., C.B., D.S.O., as Engineer-Captain on his staff on board H.M.S. *Medina* during the visit of their Majesties, the King and Queen, to India, 1911-12. On February 4th, 1912, on conclusion of the voyage, the distinction of M.V.O., was conferred upon Engineer-Captain Onyon and until February of this year, about which time he joined Messrs Wm. Beardmore & Co., Dalmuir, he was Engineer-Captain on the staff of Rear-Admiral Lewis Bayly, C.V.O., C.B., in command of the first battle-cruiser squadron.

Engineer-Captain William Onyon, R.N., M.V.O

Binding cases for Vol. XXXV of this journal will be ready very shortly. Price 1/6 each, carriage 3d. extra.

National Experimental Tank.—From figures recently published, it appears that the expenses in connection with the National Experimental Tank at Bushey, amounted to £2,464 7s. 7d. for the year 1912. The income included £1,203 as subscriptions from guarantors, a donation of £200 from the Institution of Naval Architects and receipts for test fees were £867 13s. 10d.

British Wrecks.—A circular issued by the Marine Department Board of Trade, states that the number and nett tonnage of British vessels, respecting whose total loss reports were received during last June, are as follows—thirty-eight vessels of a total tonnage of 10,634, twenty-five being sailing vessels, tonnage 1,034, and thirteen steam vessels, tonnage 9,600 ; six lives were lost.

Messrs. H. E. Moss & Co., in their steamship circular report the prosperity of the steamship trade. The amount of tonnage under construction at the beginning of the year, exceeded in this country alone over 2,000,000 gross register tons, and was the highest on record, and it is expected that the figures for the past half-year will exceed this. Most of the shipbuilding and engineering works at home and abroad are full to overflowing with orders, and have sufficient to keep them occupied for the greater part of 1914. Prices for new steamers continue to increase, and if the further demands of the workmen are conceded, will advance still higher ; consequently, it is doubtful if we will ever reach the low level of former years. Many second-hand steamers have been sold at high prices. On the opening of the Panama Canal, great developments may be expected to take place in the trade of the world.

REVIEWS.

Wireless Telegraphy and Telephony. By W. J. White, A.M.I.E.E. London: Whittaker & Co., Price 2s. 6d. nett. THE first edition of this work was published in 1906, reprinted in 1908, and the book under review is the second edition revised and enlarged. The author does not claim this work as a scientific treatise, neither is it a popular science book in the ordinary acceptance of the term. It is a work, however, which enables the general reader to grasp the principles and appreciate the practice of the latest form of telegraphic transmission. The present edition includes a brief explanation of the principles of telephony and their application to wireless telephony. The developments which of recent years have taken place in the arrangement and general construction of apparatus for wireless telegraphy are set out in some detail and in such a way as to enable the reader to follow the essential features involved. To those who have taken an interest in the litigation that has taken place in connection with systems and apparatus for wireless telegraphy the book has special value, owing to the concise and lucid manner in which the various systems are set out and their points explained.

Elementaries, Verbals and Drawings for Marine Engineers. Part II. of Griffin's New Guide to the Board of Trade Examinations. By R. A. McMillan, B.Sc.Wh.Ex. London: Messrs. Charles Griffin & Co., Ltd. Price 8/6 nett.

A DOUBLE object has been served by the author in this work: first to assist marine engineers to pass the examinations for 1st and 2nd class certificates and secondly to set out that knowledge and complete understanding of the working of marine engines, motors and auxiliaries which is necessary to anyone occupying the important position of chief engineer. Special features which may be mentioned are the working arrangement of refrigerating machinery, steam turbines and oil motors. The book is divided into six main sections, dealing with the slide valve, the indicator and indicator cards, the marine steam turbine, ship electric lighting, marine refrigerating machinery and marine oil motors. In addition to the above, examples of elementary questions usually set in the examination papers as well as of verbal questions, together with the full answers, are given, and thirty drawings illustrative of the engineering details usually set at the examinations are also given, together with instructions for filling in the statements required. Both Part I. and Part II. should be included in the library of every engineer who desires to be really an expert in his profession.

The Radio-Telegraphists' Guide and Log-book. By W. H. Marchant. London: Messrs. Whittaker & Co. Price 4/6 nett.

THIS book has been written for those who are engaged in the practical manipulation of radio-telegraph apparatus and who already possess some knowledge of electrical science. The opening chapter deals with the subject of Hertzian waves in general, and the three following chapters deal in turn with the transmitter, the antennæ and the receiver. The Marconi, United Wireless, Poulson, Lepel and Telefunken systems are then explained, and the functions of the atmospheric eliminator, telephone relay and variometer are described. Full instructions are given as to the various measurements in the electrical functions of the apparatus and the regulations and instructions for ships and stations under license by the Postmaster-General are set out in full. In the appendices are included a table to convert bearing and course into degrees, the International Morse code, the abbreviations and phrases for use by British coast stations and ships under licence, the American Morse Code, time signals, a list of stations transacting commercial business, various frequency and oscillation curves, a wire table and a table of practical and absolute units. At the end of the book a number of log forms are bound in and are thus a useful addition to the handbook. The concise simple form in which the information is set out renders this hand book a useful and valuable adjunct to any wireless operator's literary equipment.

British Corporation Register Book. — Established 23 years ago, the British Corporation for the Survey and Registry of Shipping has increased in importance, while its work has grown correspondingly. The present issue of the yearly volume reveals in its pages the enlarged area over which the influence of the Corporation has spread. The amount of tonnage registered and inspected by the surveyors now amounts to 3,152,504 tons. In the notices of launches and trial trips published each month it will be observed that the corporation is frequently stated to be the Classification Society under which the vessels have been built, and in many cases the ownership is Foreign. The annual volume contains the names of the Committee; of the officers and surveyors at the home ports and abroad; rules for the construction of steel ships and tables; list of owners, with vessels classed by the British Corporation; Register of the vessels with particulars and dimensions. The price of the volume to firms and individuals is £2 2s. and £1 1s. for each additional copy. Public Companies and Underwriting Associations, £3 3s. and £1 11s. 6d. for each additional copy. The rules and tables only, 5s. The rules for machinery, electric and refrigerating plant only, 1/6. The new regulations of the Board of Trade with regard to safety appliances and many other interesting points touching upon alterations gathered from experience, are referred to in the issue we have received by the courtesy of the Corporation.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Holidays and Wages.—July, the holiday month in the shipbuilding, engineering, and iron and steel industries of the Clyde and the West of Scotland, has this year been marked by more complete and lengthy periods of cessation than for some years, and the general healthy state of industry, combined with good steady summer weather, have been factors in the resultant time of rest and reinvigoration for the toilers. Greenock and Port Glasgow establishments were closed during the first portion of the month, while those of the upper reaches, including Govan, Partick, Whiteinch, Scotstoun, Renfrew and Dumbarton, were inoperative from the 17th till the 29th ult. Since the last celebration of "Glasgow Fair Holidays" the workers have experienced a strenuous and prosperous time, and although the course of industry has occasionally been interrupted by labour disputes, and for a time very serious trouble seemed to be imminent over the question of wages advance in the iron working section of shipyards, the result of a general ballot as to whether the offer made by the employers of ¼d. per hour, or 1s. per week advance to time workers, and 2½ per cent. to riveters should be accepted or rejected, was found to be strongly for acceptance. This result was declared some days prior to the holiday stoppage so that when the time arrived, the threatened rupture in the relations between employers and employed was dissipated and nothing marred the prospects of the holiday season. It is true that some dissatisfaction with the result was expressed by a number of the Clyde piece-workers who are not sharing in the advance, but this was only to be expected, and after the holidays it was fully anticipated that work would proceed without further difficulties being raised; all the more so that work in the yards and engine shops is still plentiful and a busy period ahead.

Six Months' Output.—During the first six months of the year quite unprecedented activity in Clyde shipbuilding has obtained, and as measured by output of tonnage the period has excelled all previous records. Altogether there were 127 vessels launched aggregating 348,470 tons gross, this exceeding the previous best output—*viz.* the first six months of 1906—by over 12,000 tons. The month of April was the chief contributor to the total, the output being 119,300 tons. This high figure was due largely to the inclusion of such leviathan steamships as the Cunard liner *Aquitania* of 47,000 tons and the Allan liner *Calgarian* of 18,500 tons. Excepting April, 1906, this is the highest monthly output in the history of the industry, but in 1906, largely owing to the launch of the Cunard liner *Lusitania*, the record monthly figure of 124,540 tons was attained.

Messrs. Harland & Wolff, Ltd., launched from their shipyard at Govan on July 10th, the first vessel laid down by them since taking over the premises from the London and Glasgow Shipbuilding Co., although in the interim several vessels have been launched which were on the stocks when the transference

of the business took place. More than usual interest therefore centred in the launch of the *Attendant* on July 10th, although as regards size the vessel was far short of the monster ships for which the firm are so renowned. In their Govan yard also, Messrs. Harland & Wolff have under construction for Messrs Elder Dempster & Co. three large steamers and in addition a triple-screw steamer of 15,000 tons for the Royal Mail Steam Packet Co.

Messrs. A. & J. Inglis, Pointhouse, have on hand, amongst other work, two steel paddle steamers for service on the River Plate; carrying passengers and cargo between Monte Video and Buenos Ayres. The length of the vessels is 320 feet between perpendiculars, breadth over sponsons 72 feet, and each has accommodation for 238 first-class and 180 third-class passengers. They will be fitted with hydraulic steering gear and cargo gear, and also refrigerating machinery. Messrs. Inglis have been, as usual at the early stages of the Clyde passenger season, extremely busy with the overhaul of Clyde steamers, one of the largest and latest jobs being the repair to the hull of the turbine passenger steamer *Atlanta*, belonging to the Glasgow and South Western Railway Co., which went ashore at Whiting Bay, Arran, in a storm some time ago.

Messrs. The North British Diesel Engine Company, Ltd., have begun the erection of works of very special construction between Whiteinch and Scotstoun, plans for which were recently passed by the Glasgow Dean of Guild Court. The crane equipment for the new works is to be provided by Messrs. Alex. Chaplin & Co., Ltd., engineers and crane-makers, Govan, and will include six electric overhead travelling cranes of 73 feet span, two of 75 ton and four of 25 ton capacity. The site of the new works occupies the river front; and it is believed that the Company intend to have a fitting-out basin for ships of about 1000 feet in length.

Messrs. Alex Chaplin & Co., Ltd., Govan, have, in addition to the contract above referred to, recently received orders from Messrs. Cammell, Laird & Co., Ltd., Birkenhead, to supply ten 5-ton electric jib cranes, having 30 feet radius, for that firm's erecting shop.

Messrs. Barclay, Curle & Co., Ltd., of Whiteinch and Elderslie, are now equally busy in both their shipyards. They have just handed over, after very successful trials, the new British India steamer *Manora* which is the second of a number of her class, intended for the London and Calcutta service of this company, which are now under construction in both their yards and in those of Messrs. Swan, Hunter & Wigham Richardson, Ltd., on the Tyne. Although the graving dock at Elderslie has all along been in operation since the stoppage of Sir John Shearer & Son who laid down the works originally, the shipbuilding area is only now being properly requisitioned. New building berths have now been completed and four vessels of large size are under way; one almost wholly in frame. Several, if not all of these are steamers for the British India Co. as above referred to. Mr. Norman M. Hunter, formerly manager of the Tranmere Yard of Messrs. Cammell, Laird & Co., is now the Manager of Elderslie, and under his spirited control this new section of Messrs. Barclay Curle and Co.'s business promises to steadily develop.

Messrs Lobnitz & Co., Renfrew, launched on July 4th, a hopper barge, 200 ft. in length and of 1,200 I.H.P., which they have built and engined to the order of Messrs. S. Pearson and Son, London, for service on the Thames. About the same date the firm had completed the shipment, in pieces, of a powerful gold dredger, built to the designs of Messrs. Inder and Henderson, London, for service in French West Africa, and of a large tin dredger built to the designs of Messrs. Cutten Brothers for the Siamese Tin Syndicate Limited. The motive power of the latter vessel is to be supplied by suction gas producer and gas engine. The firm have also despatched to her destination the new hopper barge, *Lord Devonport*, after satisfactory trials on the Clyde. To the port of Porto Alegre, Brazil, Messrs. Lobnitz & Co., have also recently sent out a long-shoot bucket dredger and it is worthy of note that bucket dredgers which were supplied by them over forty years ago are still working at the port.

Messrs. Bow, McLachlan & Co., Paisley, have received from the Department of Marine, U.S.A., a contract for the construction of a single-screw lightship 114 ft. long, 29 ft. beam, and 14 ft. 8 ins. depth moulded.

Messrs. William Denny & Bros., Leven Shipyard, Dumbarton, and the associated engineering firm of Messrs. Denny and Company, have scored still another notable success in the domain of high-speed channel steamers. They have recently completed and subjected to speed and other trials the geared turbine steamer *Paris*, and on the measured mile off Skelmorlie she accomplished a mean speed of 24·745 knots; the result being regarded as excellent. The speed guaranteed was 24 knots, and while running at the highest speed it is reported that the vessel was free from vibration and that the noise caused by the gearing of the turbines was negligible. These results have been more than confirmed by the further and more official trials carried out on the actual service route from Newhaven to Dieppe and *vice versa*. On July 14th, the *Paris* crossed to Dieppe at a speed, as certified by the officers of the State Railway of France and the London, Brighton and South Coast Railway, of 25·07 knots, and on the following day the return journey was made in the teeth of a strong north-west breeze and rough sea at a speed of 24·4 knots: the mean speed on service thus being 24·7 knots; or nearly three-fourths of a knot over the speed guaranteed. Report states that the vessel's manœuvring powers, steadiness, and freedom from vibration, formed the subjects of admiring comment.

Messrs. Archd. McMillan & Son, Dumbarton, who early in July launched the steamer *Ceylon*, and which is being fitted with machinery by Messrs. David Rowan & Son, Glasgow, have booked an order for a steamer of large tonnage for foreign owners.

Messrs. The Ailsa Shipbuilding Co., Troon and Ayr, have contracted to build and engine for foreign owners (through Messrs. John M. Campbell & Sons, Glasgow) two twin-screw steamers of about 300 ft. in length and of about 2,200 tons gross. Two recent notable productions of the Ailsa Co. are the *Asturiano* and the *Argentino*. The first-named has recently been put through her speed trials with every success, and the speed attained on the measured mile was half-a-knot in excess of contract requirements.

Messrs. Hall, Russell & Co., shipbuilders and engineers, Aberdeen, early in July launched a passenger-cargo and mail steamer named the *Sparta*. A feature is an improved type of donkey boiler constructed by the builders for supplying steam to the auxiliary machinery.

TEES AND THE HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. C. W. Duncan & Co. have bought the trawler *Sturgeon*, belonging to the Boston Deep-Sea Fishing Co., which will be converted into a tug by Messrs. Baird Bros., North Shields.

The Tees Tug Co. (Messrs. W. H. Crosthwaite) have sold the tug *Empress of India*, 138 gross tons, to Messrs. Galbraith, Pembroke & Co., London, for about £5,000.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are still very busy with work on hand. They are reported as having secured the contract to build a large twin-screw steamer for the New Zealand trade.

Messrs. W. Harkess & Co., Ltd., continue to be very busy on both old and new work; they are reported as likely to secure the order for a small steamer that is in the market.

Messrs. Richardsons, Westgarth & Co. continue as busy as ever. Mr. Tom Westgarth has resigned his position as managing director of this branch of the firm, and will, it is understood, in future act only privately as a consulting engineer. On retiring the officials presented him with a handsome testimonial in token of the very great esteem in which he was held by the staff in general. Amongst the new work reported is a large order for some very heavy boilers of 220 lbs. W.P., for a large steamer building locally.

Messrs. Smith's Dry Dock Co. continue to be very busy. Amongst the improvements being made is a very large dry dock, for which Messrs. Aird & Co., London, are the contractors. They have as much small work on hand as they can turn out.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. are reported as having secured the contract to build a two-deck oil steamer of over 8,000 tons deadweight on the Isherwood principle, for the Anglo-Saxon Oil Co.

Messrs. R. Ropner & Sons are expecting another order for a cargo steamer for foreign account, which will keep them busy into next year.

Messrs. Richardson, Duck & Co. have a large amount of work on hand. They are expecting to secure a contract to build a cargo steamer, tenders for which are in the open market.

Messrs. Blair & Co. have a very large amount of work on hand, principally for Wear and locally-built steamers, one being for Messrs. Pyman Bros. All departments are very fully occupied.

West Hartlepool.

The s.s. *Norfolk Range*, 3,054 gross tons, owned by Messrs. Furness, Withy & Co., has been sold, the price being about £27,000. The s.s. *Windermere*, 2,292 gross tons, 4,100 deadweight on 20-0 ft., belonging to Messrs. T. Appleby & Co., is now reported sold for £22,500 to Messrs. W. R. Corfield & Co., Cardiff. The s.s. *Axminster*, 1,905 gross tons, belonging to Messrs. R. Livingstone & Co., is reported as sold to Japanese buyers, with delivery out there, for £13,000. The s.s. *Parklands*, 2,029 gross, belonging to Messrs. R. Hurdy & Co., is also reported as being sold.

Messrs. W. Gray & Co. are full up with orders for new work at both the old and new yards, sufficient to keep them very busy well into next year, their dry docks being constantly employed with repair and overhaul work.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are quite full up with old and new work. The s.s. *Orlock Head*, for the Heyn Line, Belfast, will be launched shortly, and it is reported they will put down a sister ship for local owners.

The Central Marine Engine Works of Messrs. W. Gray and Co., Ltd., are very busy in every department, as they have to supply the engines and boilers for all the steamers building at their old and new yards. The stamping department is also in full swing.

Hartlepool.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Middleton Yard, are reported as having secured an order to build a cargo steamer, presumably for local owners.

Messrs. Richardsons, Westgarth & Co. are reported as having secured the contracts to supply the engine and boilers for both steamers to be built by Messrs. Irvine's, Harbour and Middleton Yards, also a set of castings for a large twin-screw steamer building abroad. Their speciality departments have plenty of work in hand.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

High Commissioner's of New Zealand visit to Hull.—The Hon. Mr. T. McKenzie, High Commissioner for New Zealand, continued his tour of inspection of the Port of Hull, visiting all important places. He was greatly impressed with the New Docks, and hoped that in the near future a number of large steamers from the Southern Ports would be seen discharging produce for the Mother Country. At the Pacific Club, Mr. McKenzie was entertained to lunch, a large and influential company sitting down. Mr. Oswald Sanderson, in proposing the health of the visitors, said Hull had had the great privilege, during the last two years, of welcoming distinguished visitors from Australia and New Zealand, and the more they saw of them, the more they appreciated them. In Mr. McKenzie they had a gentleman especially well qualified to view the facilities which Hull possessed. He might remind them that Mr. McKenzie had been Prime Minister of New Zealand and had held many other important posts, and now as High Commissioner was endeavouring to bring the two countries closer together. Mr. McKenzie in responding said he was much impressed with the energy of the men he had met, and with the confidence they had in the future of the port, which was the great highway to the interior population. It appeared to him that they were so circumstanced that they could do something for each other, and that there should be reasonable trade prospects between the two countries. The value of exports amounted to no less than £73,000,000 sterling per annum, which was almost as great as the whole British trade when Queen Victoria came to the throne. Hull imported over 6,000,000 tons of stuff, which was more than double that imported in 1887. This showed that an enormous development was taking place in the port. Hull imported £3,175,000 worth of butter alone, which was nearly double the output of butter they had in their country. He regretted to think that New Zealand was only represented by 1,750,000 lbs. of wool, as compared with Australia's 33,000,000 lbs. It would be possible for the wool used in the factories of the West Riding to be brought direct through Hull. The party also visited the Exchange, and the Chairman, Mr. Victor Dumoulin, who received them, said that the visitors would have noticed Hull's great facilities for an extension of trade, all that was now required were direct sailings between Hull and New Zealand.

River Humber Improvement.—The Humber Conservancy Board has received a report from some eminent engineers on the improvement of the Upper Humber and Trent Falls. A digest of the report which covers 52 pages has been circulated among the Members of the Board. The upper river has many changing banks to contend with, hence the engineers have recommended the use of a number of training walls to direct the strong currents to their natural place for the benefit of the river and its shipping channels. The cost of the work is given as £341,500 plus 10% for contingencies, £34,150, making an estimated total cost of £375,650.

The Wilson Line are now having six new steamers built for the line at various yards. All the steamers will be built to British Corporation Survey, and Board of Trade requirements. Mr. John Sawyer, assistant superintendent engineer has just retired from the Company, which he entered in 1871 having thus served for forty-two years. He has retired with the good wishes of the chairman and directors and engineers, and it is to be hoped that he will live for a number of years to enjoy his well-earned rest. He served under the late Mr. Cameron and Mr. Spears, and latterly under Mr. W. S. Hide, now chief superintendent engineer. Mr. C. Lundgron one of the assistants has been promoted to fill the vacancy caused by Mr. Sawyer's retirement.

Trade of the Port.—At the time of writing all work on the Docks is at a stand-still owing to the dock labourers coming out on strike on 17th July, for an increase of ½d. per hour, and, to stop work every day on the Docks at 5 p.m. About 12,000 men are out and all ships are lying idle. It is much to be desired that the men will soon reconsider their position, as such a serious stoppage of work at a moment's notice is good neither for the men nor owners. It appears that the men have stopped independently of their Societies or delegates. Later information is to the effect that the ½d. per hour has been conceded, but the employers do not agree to the five o'clock stop. The men have returned to work.

Hull Coal Trade.—The official returns show a large increase both in imports and exports. The figures for the exports abroad from Humber Ports during the first half-year for 1913, 1912 and 1911 are as follows :—3,957,637, 2,362,559 and 2,947,327 respectively.

Messrs. Earles' Shipbuilding and Engineering Co., Ltd., are keeping fairly busy with new work, and are now about finishing the s.s. *Maronian* for the Ellerman Lines of Liverpool, and are also building two steamers for the Wilson Line for the Mediterranean trade. The firm's patent slips are kept fully employed with steamers, drawing tail shafts, sighting bottoms, etc.; the repairing department is kept fairly well employed, and the prospects of the Company appear good for this year.

Messrs. Amos & Smith, Ltd., engineers and boilermakers and ship repairers, have a large amount of orders for engines and boilers for trawlers, etc., all departments being fully employed, and working overtime. The branch works at Alexandra Dock have general repairs and Graving dock work on hand.

Messrs. Stewart & Craig, engineers and ship-repairers, have had work on the following steamers, *Fredheim*, s.s. *Framlington Court*, s.s. *Oxelsund*, s.s. *Helias*, general repairs engine room and deck. Ship, *St. Louis*; ship *Amiral Cecil*, general deck repairs, etc.

Thomas Tate, engineer and boilermaker, Clarence Street, has had the following steamers under repair, s.s. *Taffy*, boiler and tail shaft survey bush rewooded, and new piston rings fitted, H. & L.P. pistons and other repairs; Tug *Holka*, engines and boiler opened out for survey; s.s. *Ceres*, engine

repairs; s.s. *Ohio*, deck repairs; s.s. *Spurn Point*, engine repairs; s.s. *Ochringen*, engine and deck repairs; s.s. *Blenhaven* deck repairs, also fitting up machinery in new oil mill, and extensive repairs to a tug in hand.

Messrs. Woodall & Co., Ltd., engineers, are very busy in all departments, and have had several coasting steamers under repair. The smiths' shop is busy with forgings for the L.C.C. and several small shipyards throughout the country. Orders from several shipowners for the firm's patent heavy purchase blocks have also been received.

Messrs. Cooper & Co., Ltd., Neptune Engine Works, are very busy with general repair and graving dock work. The branch works at Alexandra Dock are kept fully employed opening out engines and boilers for Lloyd's Survey. The firm has had again to decline orders for graving dock work, as they could not get the dry docks; steamers have had to leave the port, and proceed to the North and Bristol ports; the Company's own graving dock has been fully employed and well booked up.

Messrs. the North East Coast Engineering Works (Hull), Ltd., are keeping exceedingly busy on the following steamers, s.s. *Benheather*, s.s. *Corinth*, s.s. *Buchfield*, s.s. *Queenie*, s.s. *Hawthorn*, s.s. *Fox*, s.s. *Ormiston*, s.s. *Mercia*, s.s. *Bramley*, s.s. *Ochringen*, s.s. *Corinth*, dry docked undergoing survey and extensive repairs; s.s. *Benheather*, dry-docked and plates off bottom and building new chart-house and other repairs on deck and below, the other mentioned steamers have had the usual run of repairs, engine room and deck. The prospects of this young firm seem good.

H. Scarr, shipbuilder, Hessle, is busy building lighters for local firms of about 100 tons for river and dock use, a towing steamer is also under construction.

Dobson's Shipyard, Hessle.—This yard has been idle for a few years owing to the death of the late Mr. Dobson, but is about to be put into order again for shipbuilding, by a Hull gentleman who has gained his experience on the Clyde, and other ports, hence the sound of the hammer and the hum of machinery may be expected to be heard in this yard at an early date.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are full of work, and still booking orders for coasters, trawlers, tug boats, etc. The orders will carry well into next year. Several trawlers are now fitting out with their boilers and machinery, and some will soon be going on their official trial-trips before being handed over to their owners. Messrs. Amos & Smith, Ltd. and C. D. Holmes, Ltd., are fitting the machinery on board. The outlook for the yard appears good.

Grimsby.—At the present moment is very busy with the North Sea Fleet at anchor in the road. Several "Dreadnoughts," cruisers, etc., of His Majesty's Navy are making the Humber a base, and it appears to be a coming important Naval Base for North Sea Fleets.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(From our Own Correspondent.)

The "Olympic."—Last month this vessel was dry-docked in the Trafalgar Dock at Southampton for the purpose of the annual overhaul. The docking and undocking was accomplished without any hitch, but the circumstances of the docking were seized upon to spread broadcast baseless rumours concerning alleged damage to the turbines. It is believed the rumour emanated from Belfast. It was promptly denied by the White Star Co.; here, nevertheless more attention has been paid to the rumour than to the official denial. The vessel was only in the dry dock for two days for the purpose of examining the propellers, the most important part of her overhaul being connected with the touching up of her passenger accommodation. She will be followed by the *Majestic* for her annual overhaul, and the *Kroonland* is also due for overhaul. Last month the *Andania* sailed on her maiden voyage from Southampton for Canada with 1,300 passengers on board.

Messrs. R. & J. H. Rea of Liverpool, Cardiff and Southampton, are adding another new collier to their already extensive fleet. The new vessel is the *Valesgarth*. She will have a deadweight carrying capacity of 2,300 tons on a light draught of water.

Naval Manœuvres.—Four transports, which have been lying up at Netley since the end of the trooping season are taking part in the forthcoming Naval manœuvres. There was trouble when the articles were opened, the men refusing to sign when informed that the rate was ordinary sea pay (*i.e.*, 5/- per day). Their contention was that the work was of a special nature, and demanded special rates of pay. Most of the men belonged to the British Seafarers' Union. The men who were intending to sign on on the following vessels joined in with the strikers, and the trouble extended. Eventually the men were informed that their demands would be met, and the new rates are as follows:—Boatswains, 10/6 per day, Quartermasters and Bos'uns' Mates 8/6, and Able Seamen 7/6. Overtime to be paid at 9d. per hour after twelve hours day.

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton, have just completed and despatched an Instructional Turret for Devonport. The Booth Line tug *Arary* was completed and sailed for South America last month. The Duke of Manchester's steam yacht *Conqueror* is being surveyed, and the steam yachts *Sayonara* and *Medusa* have been at the yard for painting, etc. H.M. tug *Pilot*, and R.F.A. *Harlequin* are both at the yard undergoing extensive overhaul. The firm have in hand a coastguard vessel for the Admiralty, two lock gates for Portsmouth Dockyard, and a boiler for the Union of South Africa, in addition to two slips for the Crown Agents for the Colonies, and the usual overhaul and repair work at the Docks.

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight, have just launched a 90-ton twin-screw Diesel motor yacht. The vessel will have two sets of 150 B.H.P. six-cylinder White Diesel oil engines, which will give a speed of 13 knots. The Chilian destroyer *Almirante Lynch* has successfully completed her official speed trials at Skelmorlie. The mean speed for the six hours was slightly under 32 knots, and well above her contract requirements. This result is something of a record when it is considered that it was a coal fuel trial. The *Almirante Condell*, sister ship to the *Almirante Lynch*, is preparing for official trials. Two further vessels of this class are on the stocks, and their shell plating is in an advanced stage.

H.M.S. *Redgauntlet*, torpedo boat destroyer, is preparing for sundry contractors' trials, and her sister the *Rosalind* is nearly ready for launching. Several craft have been delivered during the past month, and the engine works are running full on various contracts.

THAMES.

(From our Own Correspondent.)

The Port of London.—The Port of London Authority has issued its annual report to March 31st, by which it is shown there is a balance of revenue of £1,076,572. This result has been achieved notwithstanding the dock strike which was such a loss to the shipping of the port and entailed heavy additional expenditure. With the charges for repairs and renewals of £75,000 and adding £100,000 to the reserve fund, there is a balance to be carried forward of £80,637. The reserve fund now stands at £281,832. The amount spent by the Authority on capital account during the year was £591,236. The Authority is taking an important step in despatching its commercial representative to Australia shortly to interest shippers there as to the facilities possessed here for handling Australian products and to explain the additional accommodation provided, with the dock expansions for produce, especially frozen meat. For the latter a contract has been let for additional buildings at a cost of £400,000. The communications between the various docks on the north side of the river have been considered by various bodies concerned and, headed by Lord Devonport, the matter of improvement has been brought to the notice of the London County Council with reference to a proposal for a new road from the Victoria Dock road to the North Woolwich road, estimated to cost £300,000 and designed to relieve the present congested state of the traffic in that district.

Shipping Cos.—The "Shell" Transport and Trading Co., Ltd., has issued its yearly statement from which it is shown that it is the most satisfactory ever put before the shareholders. The reserve fund is increased from £1,120,000, the figure last year, to £3,000,000, while on December 31st, last, the Company held £2,220,260 in actual cash or liquid

resources invested outside the business. At the meeting, a proposal to increase the capital of the Company to £10,000,000 was approved.

Messrs. Furness, Withy & Co.'s accounts for the year show a profit of £885,246 compared with £768,622 for the previous year. The ordinary shares have received quarterly dividends aggregating to 10 per cent. for the year, the balance carried forward being £131,021. Mention is made in the report of the trouble occasioned by the great dock strike. Several of the older class of boats have been sold and new ones built to replace them, which have proved very successful in working.

Sea Training.—This important matter continues to receive attention. The Metropolitan Asylums Board have lately added a second sea-going yacht, the *Exmouth II.*, to their craft lying at Grays, and at the inauguration ceremony, Princess Louise of Battenberg distributed the prizes gained by the boys of the ship. Another vessel lately honoured by the presence of distinguished personages has been the *Warspite*, at Greenhithe. The chairman of the Marine Society is Admiral Sir L. A. Beaumont, and besides Prince Louis of Battenberg, there were present Lord Brassey and Admirals Savery, Tupper and Inglefield, and many more. The National Committee on Sea Training, with Mr. Geoffrey Drage as chairman, suggest that the elementary school training in sea-faring districts should be modified to suit the requirements of boys desirous of following a sailor's career. The committee would not only have technical training for boys over thirteen years of age, but have the preparatory courses at school made to suit the life to be followed after.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

Great prominence has been given to the Mercantile Marine Interests of Liverpool by the Royal Review of vessels in the Mersey on the 11th of July, after which His Majesty opened the Gladstone Dock on the Dock Board Estate.

Messrs. Cammell, Laird & Co. — H.M.S. *Audacious* built and engined by Messrs. Cammell, Laird & Co. is engaged upon her trials at the time of writing. Whilst in the river, much attention was attracted by this example of the latest "Dreadnought." It is interesting to note that a large part of the Armour has been supplied from the firm's Sheffield Works. The dry docking took place in the firm's No. 7 dock. The *Audacious* and her three sister ships of this class, *viz.* the *George V.*, *Centurion* and *Ajax* have a displacement of over 23,000 tons as compared with 22,500 tons of the "Orion" class. The length is 555 ft., being 10 ft. longer than the *Orion*. This firm have built various types of vessels for the Admiralty during a period of about 70 years, the first vessel being the *Agincourt*, while the last battleship was the *Exmouth*, for some time flagship of the Mediterranean Fleet. The *King Orry* ran very successful speed trials on June 26th, and is now on service between Liverpool and Douglas. The *Bergenstjord* is fast nearing completion for the Norwegian Atlantic service, whilst other important contracts in hand are keeping all departments busy. The *St. George* has been refitted and after repainting left in tow for Canada where she will be employed upon coastal service. The Royal Mail Steamer, *Deseado* is being fitted with 4·7 in. guns.

Messrs. H. & C. Grayson.—All the various yards of this firm have been as usual, well occupied. In the Clarence Dock the s.s. *Katherine* has had new boilers fitted and machinery repairs carried out. The Johnstone liner *Vedamore* has had a Marconi room fitted amongst other work. At the Langton Dock the *Highland Laird* has undergone heavy damage repairs having been in hand for some time. At the Birkenhead works the *Dunedin* is undergoing heavy repairs due to grounding off Rhosneigr. The Isle of Man Steamer, *Empress Queen* has had extensive repairs, including new masts.

The Manchester Ship Canal.—It is understood that the Magadi Soda Company of London, have acquired a site of 40 acres on the banks of the canal at Irlam, for extensive works for the manufacture of Caustic Soda. The Partington Steel and Iron Company are installing an extensive battery of coke ovens at their new works, also at Irlam. Production will be in full swing in a month or two. Some 2,000 hands will find employment.

Messrs. Kermode's Ltd., have recently secured a contract for the conversion of the Torpedo Fleet of a Foreign Government to burn oil fuel instead of coal. The pressure jet system of atomization, also the patent safety air control devises being employed.

Liverpool University.—The Chair of Naval Architecture founded by Mr. Alexander Elder, shipowner of this city, has been in existence three years, having been founded in 1910. Mr. Charles Frodsham Holt, son of Mr. C. F. Holt of Drury Buildings, Water Street, has been awarded the degree of Bachelor of Engineering with honours in Naval Architecture. Besides this, Mr. Holt has been awarded the William Rathbone Medal for especial distinction in the Honours Schools of the Faculty of Engineering, also a University scholarship of the annual value of £50.

Canadian Northern Railway Co.—Recently this Company invited tenders for two high-class passenger and cargo vessels about 500 ft. long to steam about 18 knots. Sir William Mackenzie, President of the Company stated recently however, that he did not expect that these vessels would be placed while prices are so high. With the completion of this Companies' Trans-continental Railway, lines of steamers will be run from British Columbia to China and Australia and from Western Canada to Europe, *via.* the Panama Canal.

A Remarkable Feat of Navigation.—The Liverpool Ship *Harold*, 1,299 tons, has recently arrived at Queenstown from Decru Bay, Australia, with a cargo of wheat. Captain Charles Charleton finding it impossible to obtain officers at Adelaide, Melbourne and Sydney had to set sail on his voyage with a crew all foreigners except two, none of whom knew anything of navigation. For a stretch of six weeks Captain Charleton did not remove his clothes and slept on a cabin chair on the poop most of the 108 days.

The Booth Line.—The steamers of this line at present leave Liverpool three times each month for France, Spain, Portugal, Brazil, etc. calling at Havre. Beginning in September next the boat leaving Liverpool about the 20th of each month will call at Plymouth and Cherbourg instead of Havre.

White Star Line.—On July 8th, the new White Star Liner *Ceramic* arrived in the Mersey, and left on her maiden voyage to Australia by Cape Town on July 24th. The largest vessels in this service were the *Runic* and *Suevic* of 12,500 tons, but the *Ceramic* is considerably larger.

The Cunard Line.—The *Andania* left Liverpool on July 14th, for Plymouth and Southampton. Towards the end of this year the *Alaunia* will be placed on this service to Quebec and Montreal and Portland in United States. The *Ascania* and *Ausonia* are at present maintaining this service. Capt. W. T. Turner of the *Mauretania* has been made an Honorary Commander in the R.N. Reserve.

The Wallasey Ferries.—Lieutenant W. H. Fry, R.N.R., has been appointed Manager of the Wallasey Ferries, out of 109 applicants. He has been up to the present superintendent and engineer to the Vacuum Oil Company, Birkenhead. Lieut. Fry supervised the fitting out of the *Carmania*, and holds an extra master's certificate.

Death of Mr. P. B. Clarke.—The death occurred at Brussels on June 26th, of Mr. Clarke, who was well-known on the Mersey as the inventor of Clarke's Coaling Barges. Mr. Clarke who had been in failing health for some time, was a citizen of the United States, and was also associated with Clarke's Patent, Ltd., who designed and owned the Coaling Bins at Monk's Ferry.

Liverpool Salvage Co.—The death occurred at Gibraltar on June 19th of Capt. Hugh Williams, R.N.R. Capt. Williams acted as assistant to Capt. Young in the salvage of the *Agidir* at Mazargan, near Morocco and suffered from poisoning from Wheat Cargo fumes.

Isle of Man Steam Packet Company.—The *King Orry*, the new geared turbine steamer built by Messrs. Cammell, Laird and Co., for this Company developed 20¾ knots sea speed, with 8,000 i.h.p. on her speed trials. It is understood that this is the greatest power yet developed with geared turbines.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There can now be no doubt that the position of Barrow as a shipbuilding centre has been definitely fixed and is permanently assured. To begin with, the launching area in Walney Channel is one of the largest and best in the world, because not only is there a great piece of water in which to launch ships, but the action of the run in a minute or so brings any vessel launched in line with the channel, and in that position she can be at once taken possession of by the tug boats and berthed in the spacious docks, where there are two huge fitting-up berths, alongside of which new vessels lie until they are completely equipped for sea. But it is not only the natural advantages of the port of Barrow which make the shipbuilding trade of Barrow one of permanence, but the life, vigour and enterprise of the firm of Vickers, Limited, who aim to be in the front rank of business, who have the necessary capital available for the purposes of expansion, and who have at command all the expert knowledge of the direction in which they ought to go, to achieve the objects they have in view. New branches of trade are continually springing into existence, which necessitate the establishment of new departments in the already very large yard. Some years ago the firm bought out the patent rights of the Holland Submarine, and commenced to build this type of vessel for the British Government. By degrees this vessel has been very greatly improved, both in its speed, size, and fighting power. It is at present known that a very large submarine for use at sea is under course of construction. She will, it is expected, go out into deep waters away from home and be able to do great destruction to the enemies' ships. Barrow has built nearly 100 submarines for the British Navy, and has now in various stages of construction some seventeen vessels, mostly of the "E" class. Two submarines have been built at Barrow for the Mikado's Navy, and two are finishing, of the "E" class, for the Australian Navy. This has become a very important department in the works. It is always kept very busily employed, a condition of things which may be expected to continue, seeing that in some cases submarines are destined to take the place of other classes of ships now employed as adjuncts to the larger ships of the Navy.

Airships.—Barrow is destined to take a big part in the construction of airships for the British Navy, as a very large area of land has been acquired on Walney Island for this purpose and it is known that Vickers, Limited, have acquired the rights to build in this country the *Parseval*. As in the submarine department, so in this it is difficult to get hold of any official information, but it is known that when the material and machinery has been got together for airship construction it will mean the employment of from 800 to 1,500 men, and it is estimated that at least some 500 houses will be required to house these people.

Work in Progress.—There has been considerable progress made in the work in hand at Messrs. Vickers' yard during the month. The time is gradually getting nearer for the launch of the Turkish battleship, *Reshad V*. There have been many rumours that this vessel will be taken over by the British Government, but these have been as frequently denied, and it seems very probable that the ship will be finished and handed over to the Turks after all. She will probably be launched in September, and it seems certain she will be the first of a new fleet of Mediterranean warships to be owned by Turkey and stationed in the Mediterranean. The British super-"Dreadnought" *Delhi* is likely to be ready for launching soon after *Reshad V*. Then both vessels will be moored at the Buccleuch Dock berth, where they will be fitted up for sea. This will leave two building berths at liberty in the shipyard, and it is expected the firm will soon be able to book orders to fill up these slipways. The two light cruisers for the British Admiralty are beginning to lift up their frames, and a very satisfactory amount of work has been done at them. A small floating dock is being built for the Argentine Government and a large addition to the big floating dock for the Brazilian Government is being built. In the submarine department there is the greatest possible activity, and it is probable this department will be kept very actively employed for a long time to come. The difficulty at the moment is in securing a sufficient number of men, boilermakers especially, to complete the orders in hand up to fixed dates of delivery, but this is a problem which it is expected will gradually settle itself.

Labour Troubles.—Some apprehension was felt that the difficulty with the boilermakers and joiners would lead to a strike, but improved indications have lately presented themselves, and now there is every prospect that a satisfactory arrangement will be made.

Engineering.—A vast programme of work is in the hands of the engineers, who are full of orders in the machine shops for engines of various types, gun mountings, etc.

Shipbuilding Material.—There is a brisk demand for shipbuilding material, prices being firm at late rates.

Hæmatite Iron.—There is a much weaker tone in hæmatite iron, and prices are lower, at 76/- for Mixed Bessemer Nos. nett f.o.b.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff, Barry and Newport.—Although the chief ship-repairing establishments of the Bristol Channel ports have been reasonably engaged during the past month, still no special activity was noticeable. A fair number of heavy repair jobs were dealt with, but none would call for any special comment with the exception of the repair of the extensive bow and other damage sustained by the Cardiff steamer *Llandudno*, which was driven on the rocks some time ago. The tonnage arrivals have been quiet during the month and this circumstance naturally controlled the ship-repairing trade. June, July and August are usually dull months in this particular trade, so considering this factor, the amount of work done in the dry docks and yards may be taken as fairly satisfactory.

Mountstuart Dry Docks, Ltd.—In accordance with its high reputation this enterprising and flourishing concern has had a large share of the available work to deal with during the month. The outstanding feature of the work completed by this firm was the bow damage of the steamer *Llandudno* belonging to the well-known Cardiff firm of Messrs. Evan Thomas, Radcliffe & Co. This steamer went ashore on the South American coast during a dense fog and was afterwards floated and taken into Rio de Janeiro, where temporary repairs were effected to enable the steamer to complete her homeward passage. The permanent repair proved to be an extensive job and was secured by the Mountstuart Company. The plating was cut off by the Oxy-Acetylene process but the temporary repair consisting of several hundred tons of concrete and brick had to be removed by blasting. The building of the new bow in position was carried out in record time. Other vessels under heavy repair by this Company have been the *Westlands*, *Mombassa*, and *Natal Transport*.

The second motor barge for Messrs. Spillers & Bakers, Ltd., underwent a satisfactory trial during the month and immediately after the trial she was put into commission in her owner's service.

The Channel Company's docks and pontoons were fairly well employed during the month and general repairs were executed to the steamers *Kilmaho*, *Clan Mackinnon*, *Carlo*, *Iran*, *Ilmenau*, etc., at their Cardiff establishments, also to the steamers *Trekieve*, *Coniston Water*, *Francesco Ciampa*, *Don Diego*, *Cayo Gitano*, etc. at their Newport establishment.

The Junction Dry-dock Company in addition to general dock work had the steamer *St Marc* in hand for a general overhaul.

Hill's Dry-docks had a fair share of the available work and were engaged on a number of large sailing ships during the month.

Messrs Elliot & Jeffery completed repairs to the steamers *Lena*, *Polcarne*, *Poldhu*, etc., as well as minor jobs on steamers in the wet docks.

At Barry there seemed to be rather more activity in repair work than at Cardiff and the Graving Dock Company were well employed on a large number of steamers.

The Firm of C. H. Bailey had an extensive amount of general repair work throughout the dock, and completed the heavy damage repairs to the steamer *Earl of Carrick* and to the steamer *Broderick* which caught fire recently while loading.

At Newport this firm executed extensive repairs to the oil tanker *Baku Standard*, besides a number of general repairs to other vessels.

The Antarctic Expedition Ship *Terra Nova*, which has now been taken over by her former owners Messrs C. T. Bowring and Co., for use in their whaling business in Labrador, has been open to the general public during the month before the work of altering the existing fittings was taken in hand. The opportunity given for inspection was largely taken advantage of, especially by numbers of people from the surrounding country to whom the Welsh element in the Expedition appealed. In connection with the Expedition it may be mentioned that Commander Evans delivered his first lecture to a crowded and enthusiastic audience in Cardiff on July 1st.

Steam Pipe Explosion. A Board of Trade enquiry into the circumstances leading up to the main steam-pipe explosion on the Cardiff steamer *Millwall* last April has just been concluded. The defect was in the expansion piece on the pipe leading to the Starboard boiler, and the accident was caused by the steam pipe being blown out of the expansion gland, thus allowing the steam in both boilers to escape into the stokehold and engine-room, thereby causing the death of the third engineer and a fireman. The guard collar always found on expansion pipes of that description seemed to be non-existent in this instance, and its place had been taken by a pair of wrought-iron clips. These clips having been removed during the vessel's stay in port had unfortunately not been replaced before steam was raised on the boilers, with the above-mentioned consequence.

BELFAST.

(*From our Own Correspondent.*)

Work on hand.—At the quarter ended 30th June there were twenty-nine steamers under construction in Belfast, with an aggregate of 360,800 gross tonnage, compared with twenty-four with a gross tonnage of 292,350 on the corresponding date in 1912.

At time of writing, the shipyards and engineering works are closed for the annual "Twelfth" holidays.

Messrs. Harland & Wolff.—A few days prior to closing for the holidays the Queen's Island firm completed the fitting-out of the White Star Liner *Ceramic* and Messrs. McIlwraith MacEachern & Co.'s *Katoomba* and both vessels underwent successful trials. The *Ceramic* is a notable vessel in view of the fact that she will be the largest steamer trading to Australia. She is 674ft. 9in. long overall, and 655ft. B.P. by 69ft. 5in. extreme breadth. Her gross tonnage is about 18,500 and her machinery, which is of the combined type, will indicate 9,000 h.p. It is not necessary to give further particulars of this vessel here, as a full description has already appeared in these pages. Messrs. Burmeister and Wain's new Diesel engine works, in which Messrs. Harland and Wolff are interested, are now in full operation, close on a dozen sets of engines being at present under construction.

Messrs. Workman, Clark & Co.—On July 5th, this firm launched the new twin-screw steamer *Ulysses* for the Blue Funnel Line. She is 580ft. long and has a gross tonnage of 14,500. Luxurious accommodation will be provided for 350 first-class passengers. The propelling machinery—two sets of triple-expansion engines—will be supplied with steam by three double and two single-ended boilers working under forced draught. The *Ulysses* is a sister-ship of the *Nestor*, which left the builders' hands in April. Messrs. Workman, Clark & Co., are stated to have booked an order for two British India boats.

The Harbour.—The Commissioners have for some time past had before them the question of additional berthage and cranage accommodation for shipbuilders, and their solicitor, who has had the negotiations in hand, was at the last meeting of the Board instructed to inform Lord Pirrie that the Works Committee are prepared to recommend the Commissioners to carry out the scheme which his lordship originally proposed, subject to his taking up Belfast Harbour Stock equal to £60,000 in cash.

Dublin. The Dublin Dockyard Co. have a considerable amount of work in hand and are well in the running for one or two further contracts of importance. They recently launched the first of two fishery cruisers ordered from them by the Canadian Government. The vessel, which was named *Malaspina*, is 162ft. long, beam 27ft. and moulded depth 13ft. 11in. Triple engines will be supplied by Messrs. David Rowan & Co., Glasgow.

BOARD OF TRADE EXAMINATIONS.

June 26th, 1913.—LONDON.—*1st Class:* W. Gemmell, F. Nicholls, E. Norris. *2nd Class:* R. Cleghorn, C. Newman.

ABERDEEN.—*1st Class:* D. Flett, W. Hunter, G. MacLennan. *2nd Class:* D. Bain, J. Innes, A. Masson, J. Sime.

GREENOCK.—*1st Class:* J. Anderson, A. Lang, W. Ross, H. Scott. *2nd Class:* J. Brown, C. Dent, T. Lockie, R. Officer.

LIVERPOOL.—*1st Class:* J. Dunbar, E. Fraser, W. Garven, J. Richardson. *2nd Class:* A. Beech, J. Buchanan, A. Johnson, H. Leatherbarrow, H. Nunnerley, A. Robinson.

HULL.—*1st Class:* W. D'Orsey.

NORTH SHIELDS.—*1st Class:* F. Bower, C. Dodds, W. Twizell. *2nd Class:* E. Earnshaw, L. Norman, J. Watt, G. Williamson.

SUNDERLAND.—*1st Class:* W. Lyall, E. Wrangham.

July 3rd, 1913.—LONDON.—*2nd Class:* J. Clyma, C. Hart, E. Jones, N. Larsen, R. McLellan, R. Rae, J. Smith.

CARDIFF.—*1st Class:* W. Goodall, W. Lewis, J. Mundell, J. Peters, W. Rees, G. Roberts, H. Watkins. *2nd Class:* R. Fleming, F. Jones, T. Price, A. Thomas.

NORTH SHIELDS.—*2nd Class:* C. Hutton, A. Whitehead.

SOUTHAMPTON.—*1st Class:* A. Larkman. *2nd Class:* P. Barnes, H. Cameron.

LIVERPOOL.—*1st Class:* R. Craige, S. Foster, F. Pant, A. Russell, R. Williams. *2nd Class:* H. Cant, J. Clark, H. Meiklejohn, T. Penington.

LEITH.—*1st Class:* S. Montgomery. *2nd Class:* C. Addison, D. Austin, G. Cromarty, N. Sutherland.

GLASGOW.—*1st Class:* P. Buchanan, C. Fait, C. Guthrie. *2nd Class:* T. Alexander, A. Connor, W. Ferguson, H. Gilchrist, B. MacEwan, W. Richardson.

JULY 10th, 1913.—LONDON.—*1st Class:* W. Colmer, D. Miller, A. Tate. *2nd Class:* H. Barnard, H. Booth, C. Brown, W. Jickell, W. Sullivan, H. Whitley.

GREENOCK.—*1st Class:* R. Black, S. Kilpatrick. *2nd Class:* G. Andrews, M. Bishop, W. Kerr, N. Lamont, R. Spiers, T. Spiers.

NORTH SHIELDS.—*1st Class:* W. Burlinson, F. Daniels. *2nd Class:* H. Darnell, W. Durham, H. Durie, J. Phillips, R. Redshaw, W. Robson, W. Thompson.

DUNDEE.—*1st Class:* A. Cumming, J. Davie. *2nd Class:* A. Fernie, G. Fraser, A. Gill.

DUBLIN.—*2nd Class:* G. McChesney.

LIVERPOOL.—*1st Class:* J. Breeknell, G. Campbell. *2nd Class:* W. Bone, C. Butterworth, L. Criddle, C. Dunn, J. Griffith, W. King, H. Lewin, J. Ludvigeen, R. Thorpe, A. Yule.

HULL.—*1st Class:* W. Adam, A. Dennison, P. Hartley. *2nd Class:* R. Beardshaw, H. Hotham, W. Wilson.

JULY 17th, 1913.—LONDON.—*1st Class:* J. Brooker, V. Phillips. *2nd Class:* J. Bullock, J. Burrows, A. Mackenzie, W. Major, R. Souter, C. Wayman.

PLYMOUTH. *1st Class:* S. Hayman.

GLASGOW. *1st Class:* W. Baird, W. Macfarlane, W. Miller, R. Wilson. *2nd Class:* W. Leask, H. McLean, D. Macnab, G. Penman.

WEST HARTLEPOOL.—*1st Class:* P. Brunn, A. Reavley, H. Walker, J. Wood. *2nd Class:* M. Armstrong, C. Chapman, A. Mustard, S. Smith.

LEITH.—*1st Class:* J. Amour, H. Duncan. *2nd Class:* J. Simpson.

LIVERPOOL.—*1st Class:* C. MacArthur, G. Simmons. *2nd Class:* G. Ferguson, G. Washington.

NORTH SHIELDS.—*1st Class:* A. Birch, J. Clark, M. Dowsen, R. Forster, R. Phillips. *2nd Class:* W. Nelson, J. Osman, F. Stromberg.

SOUTHAMPTON.—*2nd Class:* E. Adams, W. Chambers H. Le Feuore, J. Manson, A. Warner.

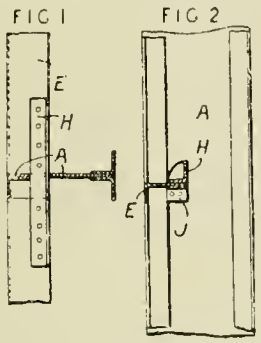
CARDIFF. *1st Class:* W. Hewitt, M. Johnson, H. Middleton, T. Thomas, E. Williams. *2nd Class:* H. Barnby, E Floyd, W. Rees, F. Thomas, H. Wyndham.

CORK.—*2nd Class:* J. McAuliffe.

Abridgments of New Patents.

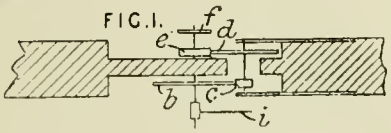
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

6421. Ships Framing. Relates to structures in which members usually at right-angles are built up with the edge of one flush with the edge of the other to receive plating, for instance, the shell-plating of a ship, and in which the width of one member is greater than that of the other. The members of lesser width are cut at the point of intersection with the wider members, which latter are pierced well within their area to permit the passage of fish-plate devices uniting the severed portions of the lesser members. Fig. 1 shows one arrangement in elevation having the member E cut where



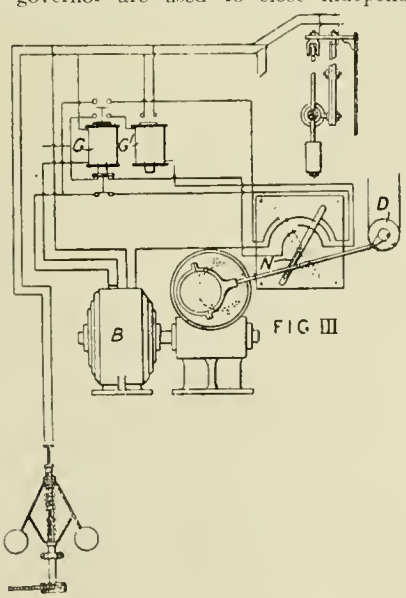
it meets the member A, the two parts being joined by the bar H, which passes through the web of the member A, as shown in plan in Fig. 2. A small lug J is also fitted. Several modifications are described, in all of which the wider member is pierced. The fish-plate device may be a forging or steel casting of the same width as the member E at each end, but narrow in the centre where it passes through the member A, being provided at this point with a flange by which it is secured to this latter member.

6665. Mariner's Compasses. A vane *f* gives a magnified



reading of the compass movements, the needle *i* being geared up to it by a train *b*, *c*, *d*, *e*.

6828. Governing Marine Engines. A pendulum and a centrifugal governor are used to close independently an



electric circuit through a solenoid G, which sets in motion an electric motor B to close the throttle valve D. To prevent the effect of accidental separation of the pendulum contacts, when these have been closed, a second solenoid G^1 keeps the circuit through the first solenoid closed until the motor has closed the throttle valve. A throw-over switch N arranges the circuits, so that after the throttle valve has been closed, the opening of the contacts controlled by the pendulum or the centrifugal governor returns the valve to its open position.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Maronian.—On June 18th, there was launched from the yard of Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, a finely-modelled single-screw steamer. The vessel, which is named *Maronian*, has been built to the order of the Ellerman Lines, Limited, and is intended for their grain and general trades. The principal dimensions are :—Length, 318 ft. 9 in. ; breadth, 42 ft. 2½ in. moulded ; depth, 26 ft. 9 in. moulded. She is constructed of steel throughout to Lloyd's 100 A1 class, special survey, and to the latest requirements of the Board of Trade, including Suez Canal and grain-carrying certificates and the new life-saving appliances rules. The vessel is arranged with erections consisting of long poop and forecastle, and is designed for carrying a large quantity of waterballast in cellular double bottom. She has a graceful stern of the cruiser type, designed by Mr. A. Dalrymple, Ellerman Lines, Ltd., in conjunction with the builders, five large cargo hatchways, two steel masts and two derrick posts arranged with fourteen derricks and six powerful steam winches for the speedy handling of cargo, also an up-to-date steam windlass. The steam-steering gear is placed in the engine casing and the hand-steering gear on poop deck. On the forward part of poop deck a commodious saloon house is erected in which are state-rooms and lavatories. The captain's cabin and chart-room are arranged in a house on bridge, and the officers and engineers are berthed in side houses abreast the engine casing, and the petty officers and crew in forecastle. A complete installation of electric lighting has been arranged. The machinery consists of a set of triple-expansion engines having cylinders 20½ in., 35¼ in., and 60 in. diameter by 42 in. stroke, steam being supplied by three large single-ended cylindrical boilers working with Howden's forced draught and at a pressure of 215 lbs. per sq. inch. The vessel and machinery have been constructed under the superintendence of Mr. A. Dalrymple, Ellerman Lines, Ltd.

Mardinian.—On June 19th, Messrs. W. Harkess & Son, Ltd., Middlesbrough, launched the steamer *Mardinian*, which has been built to the order of Sir J. R. Ellerman, Bart., for the Ellerman Lines, Ltd., of Liverpool. Her moulded dimensions are 313 ft. length, by 42 ft. 5 in. breadth, and 26 ft. 9½ in. depth. She has extra large cubical capacity for grain and general cargoes, and will carry over 5,000 tons deadweight. Of handsome appearance, with modified cruiser stern, and fully equipped for the owners' Mediterranean and Black Sea trades, the vessel embodies many special features in her construction and fittings, and represents the latest type of first-class cargo vessel. The holds, clear of any obstructions, are lined throughout with vertical cargo battens, portable in sections ; the 'tween decks are very spacious, being 10 ft. 3 in. in height, and easy access from one compartment to another is obtained by large Mechan watertight doors. The *Mardinian* has handsome accommodation amidships for a limited number of passengers, and electric light is installed throughout. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., and consists of triple-expansion engines 20½ in., 35¼ in., and 60 in. by 42 in. stroke, and three large boilers fitted with Howden's forced draught and working at 215 lbs. pressure. The vessel and her machinery are constructed to Lloyd's 100 A1 class, and have been built under the superintendence of Mr. Alexander Dalrymple, of Liverpool, and his staff.

Durley Chine.—On June 19th, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton, Sunderland, the steel screw steamer *Durley Chine*, which they have specially constructed to the order of the Alum Chine Steamship Co., of Cardiff. The vessel is of the single-deck type

with poop, bridge and forecastle. On top of the bridge there is ample accommodaiton for captain and officers, above this being the usual charthouse and wheelhouse, all elaborately fitted out, and also double navigating bridges to assist navigation when the vessel is loaded with timber. She is intended for the general cargo trade, and has exceptionally large hatches. Her dimensions are 290 ft. by 40 ft. 1½ in. by 20 ft. 8 in. moulded, and she carries about 3,200 tons on 17 ft. 11 in. Arrangements are made for a large amount of waterballast, and the vessel is fitted with the most modern deck appliances, including six powerful steam winches and steam windlass. She has been constructed to Lloyd's highest class. Engines will be supplied by Messrs. George Clark, Ltd., Sunderland, having cylinders 20½ in., 33 in. and 56 in. by 36 in., with two large boilers working at 180 lbs. pressure. Captain Anstey will take command of the vessel, and Mr. G. W. Kitching, of London, superintended the construction of the hull and machinery.

Frimley.—On June 19th, the Northumberland Shipbuilding Co., Ltd., launched from their yard at Howdon-on-Tyne, a finely-moulded steamer built to the order of Messrs. Houlder, Middleton & Co., London, to augment their fleet of fine steamers. The vessel is over 415 ft. long by 53 ft. 1 in. beam by 29 ft. 9 in. deep, and has been built under special survey to the highest class at Lloyd's, with extra strengthening for special freeboard. She is fitted with long poop, long bridge, topgallant forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge deck. The 'tween decks are lofty and so arranged that cattle, troops or emigrants may be carried if necessary. The loading and discharging facilities are most complete, the steamer having ten winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, and a large number of cargo derricks to ensure the expeditious handling of cargoes. She is fitted with the usual water-ballast arrangements for light passages. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 26 in., 42 in. and 72 in. by 48 in. stroke, three large steel boilers 15 ft. 6 in. by 11 ft. 9 in., 180 lbs. pressure. The vessel will carry about 8,300 tons deadweight on the light draught of 24 ft. 3 in., and steam about 10 knots loaded at sea. During construction the vessel has been superintended by Captain Gray on behalf of Messrs. Houlder, Middleton and Co., Ltd.

Borgland.—On June 28th, there was launched from the shipbuilding and graving dock works of the Blyth Shipbuilding & Dry Docks Co., Ltd., a handsomely-modelled steel screw steamer. This steamer, which has been built to the order of Petter Olsen, Esq., Christiania, is 335 ft. 4 in. long by 46 ft. 6 in. breadth extreme by 25 ft. depth moulded, and has been constructed to Norske Veritas classification survey, and to comply with Norwegian law reqirements. She is of the single-deck type on the deep framing principle, with poop, bridge and forecastle. Ample capacity for waterballast is provided in cellular double-bottom and in after peak. Clear holds are obtained by dispensing with pillars at sides of hatchways. Bunkers will be carried in large cross bunker; bunkers at sides of machinery spaces, and in bridge 'tween decks. The vessel is specially adapted for the general cargo, grain and wood trade, and will be equipped with deck machinery of the best and most up-to-date design for expeditious handling of cargoes, and includes ten steam winches supplied by Messrs. John Wigham & Son, Sunderland, having return exhaust arrangement. Two winches on poop and bridge have extended shafts and drums. Double derricks are arranged at each hatchway carried on derrick tables with outriggers on masts to correspond. The captain, officers and engineers will be accommodated in steel houses on bridge deck, and the crew will be berthed under the topgallant forecastle, the floors being laid with "Dolomen t" flooring by the British Dolomen t Co., Ltd., London, and Messrs. Sunderland Forge & Engineering Co., Ltd., Sunderland, are fitting a complete installation of electric light, which will include twelve large clusters for working cargoes. Triple-expansion engines, having cylinders 24 in., 38 in. and 64 in. by 42 in. stroke, will be supplied by Messrs. Geo. Clark, Ltd., Sunderland, with two main boilers. Donkey boiler by Messrs. Thos. Sudron & Co., Ltd., Stockton-on-Tees, for deck machinery. Steam-steering gear by Messrs. Donkin & Co., Newcastle-on-Tyne. Steam windlass by Messrs. Emerson, Walker & Thompson Bros., Dunston-on-Tyne. The hull and machinery are being constructed under the personal supervision of Mr. E. Teisner, of Christiania.

Dromore.—On July 3rd, Messrs. Richardson, Duck & Co., Ltd., launched from their yard a finely-modelled steel screw steamer of the following dimensions:—Length overall, 390 ft. breadth extreme, 52 ft.; depth moulded, 27 ft. 11 in.; gross tonnage, about 4,450 tons. This vessel, which has been built to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, is on the Isherwood system of construction, will take the highest class in British Corporation Registry, and has been built under special survey. This is the nineteenth vessel built for Messrs. Wm. Johnston & Co., Ltd., by Messrs. Richardson, Duck & Co., Ltd. The vessel is of the single-deck type, with a tier of main deck beams on which a partial steel deck is fitted. The erections are—poop for cargo, bridge amidships, with accommodation for captain, officers and engineers in houses on bridge deck, and topgallant forecastle for crew. A cellular double bottom throughout and peak tanks are fitted for waterballast, and equipment includes electric light throughout, ten steam winches, double derricks throughout, derrick tables and crosstrees on masts, steam windlass with quick-warping ends, stockless anchors, steam-steering gear, etc., etc. The engines, by Messrs. Geo. Clark, Ltd., Sunderland, have cylinders 25 in., 41 in., and 68 in. by 48 in. stroke, steam being supplied by two main and one auxiliary single-ended boilers, having a working pressure of 180 lbs. The vessel has been supervised during construction by Messrs. C. Surtees and D. Beatson, owners' superintendents.

Georgios.—On July 3rd, there was launched at Sunderland the screw steamer *Georgios*, which has been built for Mr. N. G. Kyriakides, of Sulina. She is of the single-deck type, and will carry about 5,500 tons. Waterballast is provided in double-bottom and in fore and after-peak tanks.

Westville.—On July 3rd, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a new screw steamer, which has been built to the order of Messrs. Balls & Stansfield (Ville Steamships, Ltd.), North Shields. The vessel, which is 347 ft. by 47 ft. 6 in. by 25 ft. 1½ in., is of the improved single-deck type, and will carry a large cargo on a light draught, with poop, long bridge and topgallant forecastle, large clear holds without beams, etc., double bottom all fore and aft for waterballast, and waterballast also carried in after peak. The captain, officers and engineers are berthed in large deck houses on bridge deck, and crew in topgallant forecastle. The vessel is built with every requisite for the rapid loading and discharging of cargoes, and is fitted throughout with shifting boards and feeders for grain cargoes, to Board of Trade requirements, and has been built to Lloyd's highest class and under their special survey during course of construction. Her engines, also constructed by Messrs. John Readhead & Sons, Ltd., are of the triple-expansion type, having cylinders 23½ in., 39 in. and 65 in. by 45 in. stroke, steam being supplied from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the sixth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Keltier.—On July 4th, Messrs. Robert Thompson & Sons, Ltd., launched from their Southwick yard the finely-modelled single-deck steamer *Keltier*, built to the order of Messrs. The Antwerpsche Zeevaart Maatschappij Co., Ltd., of Antwerp. Her principal dimensions are:—Length overall, 310 ft.; breadth, 44 ft.; depth, 22 ft. 3 in. She is built to take the highest class at Lloyd's, and is constructed on the deep frame principle with one deck, leaving the holds clear of all obstructions. The erections consist of full poop, long bridge, 176 ft. long, both available for cargo, and topgallant forecastle for accommodation of petty officers and crew. Large and spacious deck-houses are arranged on top of the bridge-deck for captain, officers and engineers, the saloon being tastefully designed in polished mahogany. There are four large hatchways with six derricks, also derrick post at poop hatch, all arranged for rapid loading and discharging of cargo, and worked by five powerful steam winches, steam being supplied from a multitubular donkey boiler of ample capacity. The engines, by Messrs. The North-Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 21½ in., 36 in. and 59 in., with a stroke of 39 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch.

LAUNCHES—Scotch.

Cabo Santa Maria.—On June 18th, there was launched at Pointhouse by Messrs. A. & J. Inglis, a steel paddle steamer, which has been built to the order of the Hamburg South American Steamship Co. for service on the River Plate. The vessel is built to carry passengers and cargo between Montevideo and Buenos Ayres, and has accommodation for 238 first-class and 180 third-class passengers. The principal dimensions are :—Length, keel and forerake, 320 ft. ; breadth over sponsons, about 72 ft . ; and depth to promenade deck, 29 ft. A large dining saloon and music or smoking-room are provided for the use of first-class passengers, and the state rooms are large and airy. The vessel will have hydraulic steering and cargo gear and also refrigerating machinery.

Morinda.—On June 18th, there was launched by The Greenock and Grangemouth Dockyard Co., at Grangemouth, the steamer *Morinda*, which has been built to the order of Messrs. Burns, Philp & Co., London and Sydney (N.S.W.). The dimensions of the vessel are :—Length, 260 ft. between perpendiculars ; breadth, 38 ft. ; and depth, 18 ft. 9 in. She is designed to carry a deadweight of 1,800 tons on 17 ft. mean draught, with a speed of 10½ knots. All boilers, cylinders and pipes, etc., are being covered with Messrs. Matthew Keenan and Co.'s patent non-conducting composition. Comfortable accommodation is fitted for thirty-two first-class and a number of steerage passengers. The vessel has been specially fitted with bulk trade rooms and retail trade rooms for business among the South Sea islands. Triple-expansion engines of good power, with two large single-ended boilers, will be supplied.

Innisjura.—On June 19th, Messrs. A. Jeffrey & Co., Alloa, launched the oil-engined vessel *Innisjura*, which they have built for the Coasting Motor Shipping Co., Glasgow. The vessel is 73 ft. 6 in. in length, 18 ft. 9 in. in breadth, and 9 ft. 6 in. in depth, and has a carrying capacity of 170 tons. She will be supplied with a Tuxham crude-oil engine developing 86 b.h.p. on a consumption of 4½ gallons per hour.

Seiyo Maru.—On June 19th, Messrs. Russell & Co., Port Glasgow, launched the shelter-deck steamer *Seiyo Maru*, which they have built for the Toyo Kisen Kaisha, of Tokio. The vessel, which is 405 ft. in length between perpendiculars, 52 ft. 3 in. in breadth, and 30 ft. in depth, and of 6,300 tons gross, has been built to the highest class in Lloyd's Register, and in conformity with the requirements of the Japanese Government. Accommodation is provided for first and second-class passengers, and also for 500 emigrants. The vessel is fitted with complete installations of refrigerating machinery, electric light and wireless telegraphy. She has been constructed under the direction of Messrs. A. R. Brown, Macfarlane & Co., consulting engineers, Glasgow, and Mr. M. Haru, the owner's representative in this country. Messrs. Rankin & Blackmore, Greenock, will supply the engines.

Gladstone.—On June 19th, Messrs. John Cran & Co., launched at their Queen's Dock Yard, a large and powerful steel screw tug and passenger tender, to the order of the Alexandra Towing Co., Ltd., Liverpool, for special use on the Mersey. The vessel has been constructed to Board of Trade requirements and under Lloyd's highest class. The machinery, of over 900 i.h.p., is being supplied as usual by Messrs. Cran. The vessel is lit by electricity throughout, and is fitted with up-to-date appliances throughout. This is Messrs. Crans' eighteenth vessel for the same owners.

St. Fergus.—On June 19th, Messrs. Hawthorns & Co., Ltd., Leith, launched from their Victoria Dockyard a steel screw steamer, of the raised quarter-deck type and built to Lloyd's highest class, for Messrs. The North of Scotland, Orkney and Shetland Steam Navigation Co., Aberdeen. Her dimensions are as follows :—Length, 150 ft. ; breadth moulded, 24 ft ; depth moulded, 11 ft. She will be fitted by the builders with triple-expansion engines of about 450 h.p. ; steam windlass, steam-steering gear, steam capstan and steam winch with patent derrick slewing gear. She has also been fitted with a Cochran (Annan) Donkey Boiler, with patent seamless furnace. The holds are fitted for the carrying of cattle and other live stock, and have all the latest improvements for an up-to-date coaster.

Hopper Steamer.—On June 20th, Messrs. William Simons and Co., Ltd., Renfrew, launched complete with all machinery on board, and with steam up ready for trials, a 700-ton hopper steamer, being the second of a fleet of eight dredging vessels they have on hand for the Naval port, Emperor Peter the Great, now under construction at Reval by the Imperial Russian Government for warship purposes. The vessel is propelled by compound surface-condensing marine engines, supplied with steam from a mild steel horizontal multitubular boiler constructed for a working pressure of 120 lbs. per square inch. Powerful steam gear is provided for rapidly raising and closing hopper doors. The vessel has been built under the survey of Bureau Veritas for classification in their registry and under the inspection of Captain M. A. Schmidt, I.R.N.

Cargo Boat.—On June 21st, the John Duthie Torry Shipbuilding Co., Aberdeen, launched a cargo boat, 150 ft. in length, for Messrs. Rennie & Mitchell, Newburgh. The engines and boiler will be supplied by Messrs. James Abernethy & Co., Aberdeen.

Innisclora.—On June 26th, Messrs. P. MacGregor & Sons, Kirkintilloch, launched the motor vessel *Innisclora*, the seventh of a series of vessels built by that firm for the Coasting Motor Shipping Co., Glasgow. The vessel is the largest yet launched at Kirkintilloch, her measurements being :—Length, 75 ft. 9 in. ; breadth, 18 ft. 3 in. ; depth, 9 ft. 6 in. She is of 115 tons gross, and 185 deadweight. The motor is of 90 h.p., and is by Messrs. Goedkoop & Co., Amsterdam. The vessel as launched is too long to pass through the locks, and part of the bow will be taken off and refitted when she has passed through the canal at Bowling. The vessel is classed with the British Corporation Registry. The firm have a vessel of similar dimensions on the stocks.

Toyora Maru.—On June 26th, there was launched by Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *Toyora Maru*, built to the order of the Mitsui Bishi Goshi Kaisha, through Messrs. A. R. Brown, Macfarlane and Co., Ltd. The principal dimensions are 302 ft. length b.p., 46 ft. breadth, 22 ft. 9 in. depth, with a gross tonnage of about 3,000 tons and cargo capacity of fully 4,250 tons. She has poop, bridge and topgallant forecastle, with water ballast in cellular double bottom, aft-peak and fore-peak tanks, and has a most convenient arrangement of hatches, derricks and steam winches for the rapid handling of cargo, electric light fitted throughout. The machinery, which is being supplied by Messrs. J. G. Kincaid & Co., Ltd., Greenock, consists of triple-expansion engines with cylinders 23 in., 37 in., 61 in. by 42 in. stroke, with two main boilers and donkey boiler.

Steel Screw Steamer for Indra Line.—Messrs. Charles Connell & Co., Ltd., Scotstoun, launched late in June a large steel screw steamer of 9,000 tons deadweight and 5,700 tons gross, for the Indra Line, Liverpool. The vessel, which is a sister ship to the *Indrani* and the *Indrakuala*, launched last year, has been built to Lloyd's highest class, with long poop, bridge and forecastle, and cellular double bottom right fore and aft, is fully equipped with all the most modern appliances for safety, and has clear holds on girder principle for large bulk cargoes. The engines and boilers are being fitted by Messrs. Dunsmuir & Jackson, Govan. Both hull and machinery have been constructed under the supervision of Messrs. G. S. Goodwin & Co., Liverpool.

Screw Steamer for Zillah Company.—Messrs. Ramage and Ferguson, Leith, launched late in June a screw steamer which they have built for the Zillah Shipping and Carrying Co. (Messrs. W. A. Savage), Liverpool. The dimensions of the vessel, which is built in excess of Lloyd's requirements, are :—Length, 160 ft. ; breadth, 26 ft. ; depth moulded, 12 ft. 6 in. She has extra large self-trimming hatchways, and is constructed with deep bulb frames and longitudinal stringers giving a clear hold for the stowage of bulky cargoes. A cellular double bottom is fitted throughout, in addition to large fore and aft-peak tanks for water ballast. Compound surface-condensing engines, supplied with steam from a boiler working at 140 lbs. pressure, will be fitted by the builders.

Steel Screw Steamer.—On July 2nd, there was launched from the shipbuilding yard of Messrs. David & William Henderson and Co., Ltd., at Partick, Glasgow, a large steel screw steamer of about 5,300 tons gross, which they have built for Messrs. A. H. & E. Gunn, Cardiff. This vessel is 440 ft. long overall, by 54 ft. 6 in. broad, by 28 ft. 6 in. depth moulded, is classed in Lloyd's 100 A1, single deck with shelter deck. She is rigged as a two-masted schooner and has an exceptionally large number of powerful derricks which, with eleven steam winches, provide ample means for the rapid handling of large

cargoes. Comfortable accommodation is provided amidships for officers, engineers, etc., while the crew are berthed in steel deck house aft. The machinery, which has been constructed by the builders, consists of triple-expansion engines having cylinders 27 in., 46 in. and 74 in. dia., by 48 in. stroke, with steam from three large single-ended boilers working at 180 lbs. pressure. The vessel has been constructed under the personal supervision of Mr. T. A. Reed, consulting engineer, Cardiff.

Ceylon.—On July 3rd, Messrs. Archd. McMillan & Son, Ltd., Dumbarton, launched the steamer *Ceylon*, which they have built for Messrs. The Stoomvaart Maatschappij Rotterdamsche Lloyd, Rotterdam. The machinery is being supplied by Messrs. David Rowan & Co., Glasgow. The vessel has been superintended during construction by Captain Guthrie and Mr. Petri, as representing the owners.

Lord Ritchie.—On July 4th, Messrs. Lobnitz & Co., Renfrew, launched the hopper barge *Lord Ritchie*, which they have built for Messrs. S. Pearson & Son, London, for service on the Thames. The vessel is 200 ft. in length, 34 ft. in breadth and 17 ft. 6 in. in depth. She will be supplied with engines of 1,200 i.h.p.

Empress Ekaterina II.—On July 7th, Messrs. William Denny & Bros., Dumbarton, launched the twin-screw steamer *Empress Ekaterina II.*, which they have built for the Russian Steam Navigation and Trading Co., Odessa. The vessel is the second of four similar ships which are under construction at present on the Clyde for the same owners—two at Dumbarton and two at Clydebank. They are intended for the trade between Odessa and Alexandria, and have been constructed to the highest requirements of Lloyd's register. Their principal dimensions are :—Length between perpendiculars, 380 ft. ; breadth, 51 ft. 6 in. ; depth to shade deck, 38 ft. 6 in., and gross measurement, 5,750 tons.

Sparta.—On July 8th, Messrs. Hall, Russell & Co., Aberdeen, launched a passenger-cargo and mail steamer which they have built for the Societa in Azione Ungaro Croata di Navigazione Marithina a Vapore, Fiume, Hungary. The vessel will take the highest class in Lloyd's register, and is of the following dimensions :—Length, 226 ft. ; breadth, 30 ft. 6 in. ; and depth, 22 ft. 6 in. The vessel has been designed to carry a large number of first and second-class passengers. The propelling machinery, which has been constructed by the builders, consists of a set of triple-expansion engines and two cylindrical multitubular boilers fitted with Howden's system of forced draught, and also an improved type of donkey boiler, constructed by the builders, for supplying steam to auxiliary machinery.

Argentino.—On July 8th, the Ailsa Shipbuilding Co., Troon, launched the steamer *Argentino*, which they have built to the order of Messrs. Duncan, Fox & Co., London, for Messrs. Sociedad Importadora y Exportadora de la Patagonie, for their passenger and cargo service between Buenos Ayres and Punta Arenas. The dimensions of the vessel are :—Length between perpendiculars, 310 ft. ; breadth moulded, 41 ft. 6 in. ; and depth moulded, 23 ft. Accommodation is provided on the upper and bridge decks amidships for 100 first-class passengers in two and four-berth state-rooms, and for 200 third-class passengers on the upper deck aft. The first-class public rooms consist of a large dining saloon, a smoking room, and a ladies' cabin. The cabin fittings throughout and the culinary appointments are of a superior class. A large refrigerating chamber for provisions and cargo is built on the main deck aft of machinery space. A wireless telegraphy apparatus of the Telefunken type is being installed. The propelling machinery, which is being supplied by the builders, consists of a set of triple-expansion engines, having cylinders 22½ in., 36½ in., and 59 in. in diameter respectively, with 45 in. stroke, steam being supplied by two single-ended boilers working at a pressure of 180 lbs. The guaranteed speed is 12 knots per hour. The vessel and her machinery have been superintended during construction by Mr. William Gray, London. The *Argentino* is a sister ship to the *Asturiano*, which has been built by the Ailsa Company for the same owners.

Attendant.—On July 10th, was launched the twin-screw passenger tender *Attendant*, built by Messrs. Harland and Wolff, Ltd., at their Govan works, Glasgow, for Messrs. Elder, Dempster & Co., Ltd., Liverpool. Special interest was taken in the event, owing to its being the first launch of the vessels laid down by this firm in Glasgow, although, since the yard was taken over, several have been launched which were then on the stocks. Although Messrs. Harland and Wolff, Ltd., are chiefly known as the builders of large vessels, they occasionally build passenger tenders, etc., of special design for their clients. The new vessel is intended to convey passengers to the express steamers of the line on Lagos roads, and also for towing purposes in that part of the West Coast of Africa. She is 131 ft. 3 in. in length overall by 27 ft. beam, with a gross tonnage of about 300, and has been built under Board of Trade survey for passenger certificate, carrying a large number on deck. She has also been built for the highest class at Lloyd's. In design and general construction the new vessel embodies the most approved principles of naval architexture, having five water-tight bulkheads all carried up to the main deck ; double bottom for water ballast, three steel decks, the forecastle deck being arranged in the form of a turtle back. The mast is of steel tube with teak pole, with two wood derricks for working baggage and mails. The steam winch and the capstan are suitably arranged on the main deck, and the steam windlass on the forecastle deck. The steering engine is placed in the engine-room, connected to quadrant aft by steering rods and chains, and a hand tiller is fitted to the rudder head for cases of emergency. The towing gear is of the latest type and the vessel has a complete equipment of fenders. The saloon is on the main deck amidships and extends the whole breadth of the vessel. It is panelled and framed in light oak with oak furniture, upholstered in moquette and the floor covered with linoleum tiles. The saloon entrance on the promenade deck is in light oak and the saloon stairway and balustrading of polished oak. A large number of buoyant deck seats are arranged on the promenade deck for passengers. All accommodation is efficiently ventilated by means of natural ventilation through cowls. Mosquito screens of phosphor bronze mesh are fitted in way of doors, side lights, skylights, ventilators, etc., and the vessel has a complete installation of electric light. There is a large baggage and store-room, also strong room and mail room. The captain's, officers' and engineers' accommodation is on the promenade deck, the officers' mess room being at the after end of the main deck. The firemen and seamen's accommodation is on the main deck. The galley is conveniently arranged on the main deck just abaft the engine casing on port side. The *Attendant* was launched practically complete, with the engines and boilers on board, and will be ready to leave for her station early in August. Messrs. Harland & Wolff, Ltd., have also under construction at Glasgow, for Messrs. Elder, Dempster & Co., Ltd., three large steamers, in addition to a triple-screw steamer for the Royal Mail Steam Packet Co., of 15,000 tons. The new vessel has been built under the supervision of Capt. W. P. Thompson, the company's marine superintendent, and Mr. J. B. Wilkie, superintendent engineer.

H.M.S. Owl.—From the yard of the London and Glasgow Engineering and Iron Shipbuilding Co., Ltd., Govan, there was recently launched H.M.S. *Owl*, torpedo-boat destroyer, the third destroyer launched this year by that Company for the British Navy. The dimensions of the *Owl* are 260 ft. in length between perpendiculars by 27 ft. in breadth. She is fitted with Parsons turbines to develop 25,000 s.h.p., and has water-tube oil-fired boilers of the Yarrow type, constructed by the builders. Her armament consists of three 4-in. guns and two torpedo tubes. The *Owl*, like the *Lynx* and *Midge*, which are now in the builders' private dock, is of the "Acasta" class, representing an important development in destroyer construction, and these vessels are expected to attain a very high speed. The *Owl* has been constructed under the supervision of Mr. H. G. White, hull overseer, and Engineer-Commander H. E. H. Ash, R.N., engineer overseer.

LAUNCHES—Irish.

Ulysses.—On July 5th, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their North Yard the twin-screw steamer *Ulysses*, built for the Blue Funnel Line of Messrs. Alfred Holt & Co., Liverpool. The new steamer is a sister of the twin-screw steamer *Nestor*, which left Belfast in April, and is intended for passenger service between Great Britain and Australia. The *Ulysses* is 580 ft. in length, has a gross tonnage of 14,500, and complies with the Board of Trade requirements for a first-class passenger steamer. The accommodation, which is for first-class only, occupies the

midship portion of three decks, and is arranged for 350 passengers in comfortably furnished state-rooms, the inner rooms being on the tandem system, giving them light and ventilation from the ship side as the outer rooms. These rooms are in white, with mahogany furniture, and each is provided with an electric fan for use while passing through the tropics. The dining saloon is exceptionally lofty and extends the full width of the vessel and is well furnished with small tables and movable chairs. It is lighted by large circular ports in the sides and a central lighting well, which rises through three decks, with carved balustrades at each, and is surmounted by an artistic stained-glass skylight. The decorative scheme is light in tone, the ceiling and wall panelling being in white and grey, and the furniture of oak. Adjoining this saloon is the nursery, suitably furnished and decorated for the use of children. The main entrance hall, on the centre castle deck, is arranged so as to afford ample space at all times. From this hall handsome broad oak staircases give access to the dining saloon on the deck below, and the entrance hall on the promenade deck above. There is also a vestibule at each side with double doors opening out on to the centre-castle deck which, with the promenade deck above, affords abundant sheltered space for promenading and recreation under all conditions of weather. The music-room is a gracefully designed apartment with wall and ceiling decorations in white and grey, with portable oak furniture. On the promenade deck there is a large and luxurious saloon lounge, with a wagon roof, and well lighted by large square windows in the sides and end, while a couple of bay recesses afford an extensive outlook. The smoking-room is also on the promenade deck and is panelled and furnished in oak, the wall being decorated with carved panels and the furniture upholstered in green leather. The room is lighted by square windows in the sides and by dormer lights in the waggon roof. Opening off the after end there is a well-sheltered verandah and bar suitably furnished, forming a pleasant open-air lounge. Other interesting features that may be mentioned are the fully-equipped wireless telegraph room, the steam laundry and the barber's shop. The vessel has seven holds, which are free of obstruction and capable of receiving the largest type of consignment. One of these holds, also the after 'tween deck space, have been insulated for carrying frozen meat, dairy produce and fruit cargoes, for the preservation of which there is an extensive installation of refrigerating machinery. The propelling machinery consists of two independent sets of triple-expansion engines with a complete installation of auxiliaries. Steam is supplied by three large double-ended and two single-ended cylindrical multitubular boilers, working under an approved system of forced draught.

Malaspina.—On July 6th, the Dublin Dockyard Co. launched the first of the two fishery cruisers which they are building to the order of the Canadian Government for service on the Pacific coast. The vessel, which was named *Malaspina*, is 162 ft. in length, 27 ft. in breadth and 13 ft. 11 in. in depth moulded. She is divided by transverse and longitudinal bulkheads into no fewer than twenty water-tight compartments. The propelling machinery, which is to be supplied by Messrs. David Rowan & Co., Glasgow, will consist of triple-expansion engines designed to give a high rate of speed. Steam will be supplied at 180 lbs. pressure from a marine type boiler worked under forced draught on the Howden system.

TRIAL TRIPS.

Ocean Pilot.—On June 19th, the new wood steam drifter *Ocean Pilot*, built by Messrs. Beeching Bros, Ltd., and engined by Messrs. F. W. Carver, both of Great Yarmouth, ran her trials outside that port, when she developed a speed of 9 knots. During the trial the engine ran most satisfactorily and the boiler could more than supply the steam required. The vessel's principal dimensions are :—Length, 86 ft. ; breadth, 19 ft. 10 in. ; depth, 9 ft. 8 in., the engines being C.S.C. 11¼ in. by 26 in. by 18 in. stroke. The boiler is 9 ft. 6 in. by 9 ft., 150 lbs. w.p. This vessel was built to the order of Messrs. Bloomfields, Ltd., of Great Yarmouth, and is the eighth built for them by Messrs. Beeching Bros., Ltd. Ship and engines were built under the supervision of Mr. Percy Page.

Ocean Harvest.—This vessel, which has been built by Messrs. Beeching Bros., Ltd., of Great Yarmouth, and engined by Messrs. Crabtrees & Co., Ltd., of the same town, ran her trials on June 23rd, when everything proved satisfactory. The vessel developed nearly 9½ knots, which, considering the state of the weather, was quite satisfactory. The vessel's principal dimensions are :—Length, 86 ft. ; breadth, 19 ft. 10 in. ; depth, 9 ft. 8 in. The engines being C.S.C., 11¾ in. by 26 in. by 18 in. stroke. The boiler is 9 ft. 6 in. by 9 ft., with a 140 lbs. w.p. This vessel has been built to the order of Messrs. Bloomfields, Ltd., and is the seventh boat built for them by Messrs. Beeching Bros., Ltd., and makes the sixteenth drifter owned by this Company. Both ship and engines were built under the supervision of Mr. Percy Page.

Evangelos.—On June 20th, the first-class finely-modelled screw steamer *Evangelos*, built by Messrs. Robert Thompson and Sons, Ltd., at their Southwick Yard, to the order of Messrs. Ambatiolo Brothers, of London, proceeded to sea for her official loaded trial. The trial trip, which was under fully loaded conditions, was very successful, the engines (by Messrs. John Dickinson & Sons, Ltd., Sunderland) running with perfect smoothness, the vessel easily attaining a mean speed of 11 knots, which exceeded the guaranteed speed. The owner, Mr. E. Ambatiolo, who was present, expressed entire satisfaction with both vessel and machinery. After the trial the vessel proceeded to Genoa under the command of Captain Rossolimos. For Launch, see June issue.

Nominoe.—On June 21st, this steamer, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Messrs. Société Anonyme des Voiliers Nantais, Nantes, after taking in cargo in the Tyne, was taken for her trial trip. The owners were represented by their chief inspector, Mr. A. Martail, under whose superintendence the ship and machinery have been built. The trial was entirely satisfactory, and on its completion the vessel proceeded on her voyage. For Launch, see June issue.

Manora.—On June 24th, the new British India steamer *Manora*, built by Messrs. Barclay, Curle & Co., Whiteinch, ran successful trials on the Clyde. On the measured mile she maintained easily a speed of 13¾ knots, the machinery running very smoothly. For Launch, see June issue.

Tregarthen.—On June 24th, the new screw steamer *Tregarthen*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain and Son, St. Ives, Cornwall, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel will load for Port Said under the command of Captain Roach. For Launch, see July issue.

Hesperos.—On June 24th, the steamship *Hesperos*, built and engined by Messrs. William Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. Bruusgaard, Kiosterud and Co., Drammen, ran a successful sea trial, when a speed of 11½ knots was attained. For Launch, see July issue.

Wascana.—On June 28th, the fine steel screw steamer *Wascana*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Mr. Ragnvald Blakstad, on behalf of the Aktieselskabet "Asker," Christiania, proceeded to sea for her official trial. The trials passed off most successfully and the vessel returned to the Tees to sail for Wabana under the command of Captain Georg Barstad. For Launch, see June issue.

Patuca.—On June 28th, the new twin-screw steamer *Patuca* left Belfast Harbour and proceeded to Carrick Roads for adjustment of compasses, afterwards undergoing speed and general machinery trials, all of which gave the utmost satisfaction. The vessel then left the Lough on the initial voyage to Port Limon, South America. The *Patuca* has been designed and constructed by Messrs. Workman, Clark, and Co., Ltd., Belfast, for the general fruit-carrying and passenger service carried on by Messrs. Elders & Fyffes, Ltd., London, between British and West Indian and Central American ports. The vessel is a sister ship to the *Patia*, which left Belfast a couple of months ago, and is 432 ft. in length, with a gross tonnage of 6,103 tons, having been built in accordance with the requirements of the British Corporation Registry of Shipping and the British Board of Trade. For Launch, see June issue.

Asturiano.—Early in July the new steamer *Asturiano*, built and engined by the Ailsa Shipbuilding Company, Troon, to the order of Messrs. Duncan, Fox & Co., London, for the Sociedad Importodora y Exportadora de la Patagonie, for service between Buenos Ayres and Punta Arenas, ran official trials on the Firth of Clyde. There was a large company of guests on board. The trials were satisfactory in every respect. The speed attained on the measured miles was half a knot in excess of the contract requirements. For Launch, see June issue.

Ceramic.—On July 5th the *Ceramic* left Belfast for Liverpool and left there for Australia on July 24th. The vessel has been built by Messrs. Harland & Wolff, Ltd., for the White Star Line Australian Service and is of the following dimensions: Length overall 674 ft. 9 in., length B.P. 655 ft., breadth (extreme) 69 ft. 5 in., depth (K to B) 48ft. (upper deck), indicated horse-power 9,000 (about), gross tonnage 18,500 (about). During construction the vessel has been under the supervision of Mr. E. Lionel Fletcher, manager, White Star Line; Captain Bartlett, marine superintendent; and Mr. W. J. Willett Bruce, superintendent engineer. For Launch, see January issue.

Floridian.—On July 9th, the steamer *Floridian*, lately launched from the shipyard of Messrs. Short Brothers, Limited, at Pallion, Sunderland, left the Wear for her official trials. She is constructed on the Isherwood Patent system to the order of Messrs. Frederick Leyland & Co., Ltd., of Liverpool, and carries a deadweight of 7,700 tons on a moderate draught with a fine co-efficient. The trial trip, which was attended by Captain Fry, of Liverpool, Mr. Johnston Hughes, of Belfast, Mr. Thos. S. Short representing the shipbuilders, and Mr. J. Pilling representing the engineers, was very successful, the vessel in ballast trim making a speed of 12¾ knots with a marked absence of vibration. For Launch, see July issue.

Kiruna.—On July 9th, this vessel proceeded to sea on her official trial runs. She has been constructed by Messrs. Joseph L. Thompson & Sons, Ltd., of the North Sands Shipbuilding Yard, Sunderland, having been built to the order of Messrs. Rederiaktiebolaget Lulea Ofoten (P. A. Welin, manager) of Stockholm, and is the second vessel Messrs. Thompson have constructed for this Company. The trial trip was most successful in every way, the vessel easily maintaining an average speed of over 12 knots, and everything worked smoothly and gave complete satisfaction to all on board. For Launch, see July issue.

Photinia.—On July 9th, the s.s. *Photinia*, built by Messrs. Wm. Pickersgill & Sons, Ltd., Sunderland, to the order of the Stag Line, Ltd. (Messrs. Jos. Robinson & Sons, managers), left the yard of her builders for her trial trip, which was in every way satisfactory. After the trial she proceeded to the Tyne to bunker. The vessel is classed with the British Corporation. For Launch, see July issue.

Katoomba.—On July 10th, the triple-screw passenger and cargo steamer *Katoomba*, built by Messrs. Harland & Wolff, Ltd., Belfast, to the order of Messrs. McIlwraith, McEacharn and Co., Proprietary, Ltd., of London and Melbourne, left the builders' works and, after adjustment of compasses and a satisfactory trial trip, proceeded to Glasgow, whence she will sail for Melbourne shortly. The new vessel, which is 468 ft. long by 60 ft. beam and about 9,500 tons has been specially designed for the Australian trade, and has been built under the survey of the Board of Trade for passenger certificate, also to the highest class in Lloyd's Register and, during construction, the vessel and her machinery have been under the supervision of Mr. R. E. Thomson, of Melbourne, the owners' superintendent engineer. For Launch, see May issue.

City of Norwich.—On July 10th, the trial trip of the handsome steel screw steamer *City of Norwich*, built by Messrs. Wm. Gray & Co., Ltd., for the Hall Line section of the Ellerman Lines, Ltd., Liverpool, took place. The owners were represented by Mr. A. Dalrymple, superintendent engineer, and his assistant, Mr. R. Sharp. Captain Stevenson, of the Hall Line, also witnessed the trial. Mr. James Innes attended on behalf of Lloyd's Registry. The performance of ship and machinery was entirely satisfactory, a speed of 14½ knots being obtained. For Launch, see June issue.

Westerdyk.—On July 11th, the steel screw steamer *Westerdyk* proceeded on her official trial trip. Throughout the trial the engines and all auxiliaries worked admirably, the owners' representative, Mr. H. van Helden, expressing entire satisfaction. The vessel afterwards proceeded on her voyage to Rotterdam. For Launch, see June issue.

Tenadores.—On July 11th, this new steamer, built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, left the harbour and proceeded down the Lough to Carrick Roads for adjustment of compasses, machinery trials and speed tests. These all passed off most successfully, and the vessel afterwards returned to the Port to complete the outfit, and take in stores preparatory to leaving in the course of a few days for Limon. The *Tenadores*, a sister vessel to the *Pastores*, which left Belfast early in January, is intended for general fruit-carrying and passenger services in the West Indies, and is 486 feet long with a gross tonnage of 7,780, and conforms to the requirements of the British Corporation Registry, the British Board of Trade and the United States Steamship Inspection Service. For Launch, see May issue.

San Silvestre.—Trials have recently been run of the oil-tank steamer *San Silvestre*, which has been built on the Isherwood system of longitudinal framing by Messrs. Swan, Hunter and Wigham Richardson, Ltd., at their Wallsend Shipyard. During the trial everything worked without a hitch, to the satisfaction of all concerned. For Launch, see July issue.

El Toro.—On July 12th, the steamer *El Toro*, which has been constructed at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the order of the Lobitos Oilfields, Ltd., of London, went for a very successful trial trip off the Tyne. Both engines and boilers have been built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works, and on the trial trip they worked without the slightest hitch, driving the steamer at a speed of 11½ knots per hour. For Launch, see July issue.

Novgorod.—The s.s. *Novgorod*, recently sold by Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the Russian Volunteer Fleet Association, has now left the Wallsend Shipyard to load a cargo of coal previous to running her official trials at sea. General Stenger, a director of the Russian Volunteer Fleet Association, is representing its owners and he is ably assisted by Mr. E. de Grofe, their naval architect, and by Captain Babichuk, commander of the ship. For Launch, see May issue.

Spitfire.—Under the naval programme of 1911-12 twenty ocean-going torpedo-boat destroyers were ordered, and of these Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Wallsend-on-Tyne, were entrusted with three, *viz.*:—H.M.S's. *Shark*, *Sparrowhawk* and *Spitfire*. The first two were completed some time ago. H.M.S. *Spitfire* has a displacement of about 1,000 tons, her length being 260 ft. and breadth 27 ft. Three 4-inch guns and two torpedo launching-tubes are mounted on the vessel. The propelling machinery and boilers have been built by the Wallsend Slipway and Engineering Co., Ltd. The boilers are of the Yarrow water-tube type, fitted with oil fuel. During all the trials an ample supply of steam was steadily maintained. H.M.S. *Spitfire* has two screws each driven by an independent Parsons impulse-reaction turbine. The ahead and astern turbines are embodied in the same casing, steam being admitted to either section through groups of nozzles. The number of nozzles taking in steam can be controlled at will, in order to suit the speed at which it is required to work the turbines, and thus the best possible economy is obtained, both when running the vessel at high powers or at lower cruising powers. The trials of H.M.S. *Spitfire*, which have been carried out so successfully, included an eight hours' trial at full power, a trial for twenty-four hours at cruising speed to test the consumption of oil fuel, gun trials under service conditions, testing the torpedo launching tubes, steering and turning trials, running both ahead and astern, and anchor trials and tests of the capstan gear, cable stoppers and nippers. After these exhaustive trials the turbines were opened out. The vessel was then made ready for sea in every detail and the acceptance trial was successfully performed to the satisfaction of all the Admiralty and other officials concerned, the ship running at three-quarter speed for four hours. H.M.S. *Spitfire* will be followed by H.M.S. *Sarpedon* and *Ulysses*, at present under construction at the Wallsend shipyard. The former is launched and has her turbines and boilers on board. H.M.S. *Ulysses* will probably be launched in about six weeks' time.

The Marine Engineer

And Naval Architect.

LONDON, SEPTEMBER, 1913.

SIGHT TESTS.

IN our August issue we ventured to express the view that the Board of Trade should deal with the question of sight tests in such a way as to save time, trouble and anxiety, and we are glad to note that the President of the Board of Trade has, in answer to a question put to him in Parliament, stated that the proposed form vision tests are to be abandoned and requirements of a much simpler character are to be substituted. We are sure that this announcement will cause much relief to many officers of the mercantile marine, who were very apprehensive as to the utility of the tests and the effect they were likely to have on their future career. It is somewhat regrettable that so much anxiety has been caused to a body of men whose work and ability are recognised by the travelling public. The position now appears to be that the Board has decided that in the case of an officer already holding a certificate there will be no necessity for any test for colour perception on going up to a higher grade, and that having once passed the colour vision test he will have no further anxiety, either as to further tests by wool skeins or by lantern, as only those going up for their first certificate will undergo these tests. We think that the modifications made under considerable pressure will remove much difficulty of administration by the Marine Department of the Board of Trade, but what is of far more importance, the justifiable anxiety and concern of present-day officers (many of whom are of long service) will be removed. The next thought which naturally arises is as to the position of those officers whose certificates have been cancelled, and, as it turns out, without just cause or for a sufficient reason. It logically follows that these men must be restored to their former positions as certificate holders and at the earliest possible moment. All this business tends to prove conclusively that the Board of Trade has been advised in a manner which cannot in any sense be characterised as wise or practical, and we feel sure that regret is felt for the ships' officers, under the circumstances that have obtained in the past, by no body of men more than by those who form the Marine Department. Coming now to the question of form vision, it is important to note that the President stated that he had carefully considered the points made to him with reference to the new standard, which required the person to have normal vision in one eye and half normal vision in the other, and he had decided to make a substantial modification in this standard, by omitting the requirement of the weaker eye and by making the standard normal vision only. Under this modification the candidate will have the option of either using both eyes together or either eye separately, as he may himself decide. This, it will be recognised, is a marked departure from the original proposal and entirely sets aside the recommendation of the Departmental Committee in the matter. Taking it altogether, it may be said that the Board of Trade has done what any thoughtful person knew they must do in the long run, and ships' officers owe a debt of gratitude to those who have agitated so successfully on their behalf. It is to be sincerely hoped that in the future the proceedings of the Marine Department will be directed with more practical common sense and more regard for the feelings of those who are subject to the regulations made by them.

TURBINES *VERSUS* TRIPLE-EXPANSION ENGINES.

THE subject of the comparative merits of the turbine and the triple-expansion engine as the propulsive means for ships has been dealt with by us in one or two of our recent issues, particularly in connection with the paper read by Mr. Waldie Cairns at the North-East Coast Institution of Engineers and Shipbuilders. As this paper and the discussion thereon may be taken as a corollary to the discussion of the relative possibilities of the Diesel engine, geared turbine and suction gas engine dealt with about a year ago, it appears to us desirable to give shortly the views of some of those representative engineers who took part in the discussion, as exemplifying the so far crystallized opinion on the subject. A point worthy of note is one dealt with by more than one speaker, *viz.*, that the trial between the *Cairnross* and the *Cairngowan* was only a comparative one between two similar vessels under similar conditions at the same time, and not a trial on a quantitative basis for comparison with records already existing as to the performance of the reciprocating engine. It will be remembered that the nett result of the trial in question was that the triple-expansion engine required 17·6 per cent. more fuel than the turbine. Mr. Gerald Stoney, in the discussion, expressed the view that in ten years' time there would not be a direct-driven ship in hand, and pointed out that although considerable advance had been made in the adaptation of turbines for marine work, the efficiency was 5 to 10 per cent. lower than obtained on land, owing to the revolution factor adopted. The advantage of gearing and a high-speed turbine was well shown in the fact that the *Hantonia* and *Normannia* were 40 per cent. better than the other boats on the same service, and about half of this gain was due to the increased efficiency of the turbines alone. Besides the general advantage of high revolution of turbines, there was the fact that the weight and bulk of a turbine with a given co-efficient varied approximately inversely as the square of the revolutions, and thus at higher speeds the turbines were much smaller and could, in practice, be made not only with higher co-efficients, but also with finer clearances. The many objections to the use of superheated steam in large turbines, owing to expansion troubles, were removed by increasing the speed and reducing the size. With reference to mechanical efficiency, that of the helical gear was 98 or 99 per cent., and by the use of pivoted thrust blocks the co-efficient of friction had been reduced from about $\frac{1}{95}$th to something between $\frac{1}{800}$th and $\frac{1}{1000}$th. On the main

question, Mr. Stoney was of the opinion expressed by Mr. Ferranti and Sir Charles Parsons, that the electrical method of transmission could not possibly compete with mechanical gearing. Mr. W. Weir made an interesting and illuminating addition to the discussion by his treatment of the subject, particularly in reference to the hot-well temperatures and lower vacua, and pointed out that his expressed opinion, regarding the questionable value of high degrees of vacua for direct connected marine turbines at full power, did not apply to geared turbine installations, wherein the blading was designed on the basis of land turbines for usefully utilising the high degrees of vacua. On the general question of geared turbines, his opinion was that the time of criticism had passed, and if he were an engine-builder instead of a pump-maker, he would clear a part of his shop and place some orders for turbine lathes and gear-cutters. Mr. D. B. Morrison considered that the trials made marked a distinct advance in engineering progress, and the paper under discussion was valuable because it set forth, carefully ascertained and corrected recorded facts on which 15 per cent. saving in coal was shown. Coal consumption, *per se*, it must be remembered, was only one factor in the economies of steamship propulsion. For example, the geared turbine required less stoke-hold labour, less engine-room labour, less oil, less stores and less upkeep, and in addition, facilities were afforded by the turbine for the safe application of super-heated steam without the dangers attendant on internal lubrication. Mr. Morrison stated he had run a Parsons' type turbine of 1000 horse power for 2½ years, excluding Sundays and holidays, without lifting the cover, and during that period the consumption had been constant and the repairs nil. It was recognised that the initial cost of geared turbines was undoubtedly greater than that of the triple-expansion reciprocating engine, especially as owners were reluctant to allow any reduction in the size of boilers, whilst compared with quadruple-expansion engines, the saving in coal would be about half that of triple-expansion engines. When the cost of manufacturing gear wheels was reduced, the rapid adoption of geared turbines was certain.

Mr. E. H. Dashper, of the London and South Western Railway Company, gave some interesting particulars as to the running of their steamers, *Normannia* and *Hantonia*. On opening up after the first year's running of 27,000 knots, the wear on the gearing was so small that the tool marks on the teeth were still visible, and the cost of repairs of the whole installation for the same period was nil. Comparing the running of these boats with the three older direct-driven turbine boats, it was interesting to note that although the time on the passage had been shortened, necessitating a speed of approximately 19 knots, it was found that the coal consumption per voyage was 46·9 tons for the geared turbine boats, and 75·5 tons for the direct-driven turbine boats. As to experience at sea, in rough weather racing was almost unknown in the engine room of the geared turbine, and in manœuvring in and out of port the geared twin-screw steamers showed a marked and decided improvement over the direct-driven three-screw type. We think Mr. Cairns is to be warmly congratulated on the fact that his papers elicited such a valuable and instructive discussion.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Call at Queenstown.

THE announcement by the Cunard Company that the outward call at Queenstown is to be omitted in the case of the *Lusitania* and *Mauretania* means, of course, that the Sunday morning call will soon be a thing of the past, since, when the *Aquitania* appears on the scene, the whole service will be conducted by the three vessels named, and it will be only when the *Campania* or some other vessel, such as the *Carmania* or the *Caronia*, takes the turn as reserve ship that the considerations which are put forward as having induced the proposal for change would not apply. It is said that the reason for making the change is the fact that in the opinion of the Board of Trade, Queenstown harbour is not safe for vessels of the *Lusitania's* dimensions. No doubt there is great risk in taking vessels of this tonnage in and out of the narrow entrance to Queenstown. But undoubtedly also there are other arguments against the continuation of the call. In the old days when the call was first instituted, the Atlantic cable did not exist, and it was extremely important that despatches should be landed at the first possible moment, so that they could be re-transmitted by telegraph to London. This for the east-bound vessels. Similarly, however, it was desirable that the latest telegrams should catch the west-bound steamers. But that consideration lost much force when the cable became a permanent institution. And the wireless installation has entirely removed it, since, nowadays, the steamers themselves are, theoretically at least, in touch with the whole world throughout the voyage. Then there was the question of time. In the early sixties the Irish mail ran at a mean speed not far short of that at which it travels to-day. The Kingstown mail steamers were of an unprecedented power, whilst say 12 knots on the Atlantic was a very fine performance. It was obviously worth the cost of sending the mails to Queenstown under such circumstances. Many hours were saved by the arrangement every week. But as twelve knots gave place to sixteen and twenty, the maintenance of the call became a questionable advantage to English correspondents, though, of course, the Irish saw many excellent reasons against a change. Now, when we have twenty-five knot ships which can run from the Rock at Liverpool to Queenstown in, say, nine hours, there is no saving of time. Meanwhile the cost of the special service has increased. A correspondence is published which shows this clearly enough. For the special Cunard service from Euston every Saturday, the London & North-Western Railway used to receive a sum of £5,510 per annum from the Postmaster-General, one-third of which sum was repaid to the Department by the Cunard Company. The North-Western has now declared that it cannot grant the facility in future at less than £7,830 a year. The reasons which it puts forward are held to be sound by the Post Office, which accedes to the request, and so interesting are they, as bearing on the general cost of transit, that we may well set them out. They chiefly rest on the undoubted facts that the cost of coal and wages have largely increased. On this account the Railway people maintained that they can no longer provide a weekly steamship across the Irish Sea at £80 a trip. They say—and the Post Office agree—that £100 is the fair price. For similar reasons the cost of the special on the English side has to be increased from, as hitherto 4/6 a mile, to 5/-. Further, for some reason which does not quite appear, the mails must be run special in future from Crewe to Holyhead instead of only from Chester. This latter is not of much importance, however. The final point is the fact that, owing to the greater weight of mails dealt with, more time is needed for transfer both at Holyhead and at North Wall, and thus to keep her time of arrival at Queenstown the Irish train must run at a higher rate of speed, and this fact will cost the North-Western another £100 a year. But this last argument is one which shows that it is highly probable that, in spite of apparently higher charges against the Mail service, the Post Office finds the carriage of these mails an increasingly lucrative business. For we must remember that though

the contractors get a lump sum, the Post Office is paid by weight and that a very few hundredweights extra shifted mean a vast amount of money in their coffers. Thus it comes that by the publication of the correspondence with the Railway Company, we see something of the cost of the transit to Queenstown and understand why, when other reasons militate against its continuance, the Department may not be altogether averse to the change. Ireland will not do badly with its services, even if it loses the Cunard's on Sunday mornings. The Thursday New York steamers of the White Star Line from Liverpool will still call there, as do the mid-weekly mail vessels of the same Company from Southampton ; and the Boston Cunarders do not seem likely to leave the old port of call. But if only for sentimental reasons there are still many who will regret the change.

The "Titanic."

The general press "let itself go" when the American papers published a harmless report from Captain Remnant, of the British steamship *Luciline*, to the effect that he had passed wreckage off the Banks of Newfoundland in pretty much the longitude in which the *Titanic* went down. A paragraph went the round of the press to the effect that it was possible that it might be the wreck of the *Titanic* herself which might be "standing on end on a submerged ledge which perhaps existed in that spot," even though the chart appears to show a depth of, say, 2,000 fathoms in the neighbourhood. But one London paper—a journal which considers itself of the highest intellectual class—had a comment on the news which is certainly worthy of mention. It suggested that the fatal iceberg itself might have had a ledge "many fathoms down on which the vessel might have rested after sinking," and then went on to say that in the course of melting "*the ledge would approach the surface and might possibly expose the wreck.*" The expert who penned this delicious effusion evidently did not know that the *Titanic* ran a long distance past the iceberg before her way was run off and never approached it again, and he seems to further imagine that icebergs of one year survive into another ! The fact seems to have been that the *Luciline* simply saw and duly reported a not unusual danger—an old spar standing on end 6 ft. out of the water.

The August Bank Holiday of 1913.

will be remembered at Liverpool for the marvellous performance of the Isle of Man Steam Packet Company in catering for the unprecedented rush of tourists to the Isle of Man on the Saturday preceding the holiday. Their programme from Liverpool Landing Stage to Douglas was as follows :—

Time of Sailing.	Steamer, how propelled.	Tonnage gross.	Year of build.	Builders.
9.15 a.m.	*Ben-My-Chree* (turb.)	2,651	1908	Vickers, Ltd.
9.45 ,,	*Queen Victoria* (paddler)	1,657	1887	Fairfield Co.
10.15 ,,	*Prince of Wales* (paddler)	1,657	1887	Do.
10.45 ,,	*Mona's Queen* (paddler)	1,595	1885	Barrow S.B. Co.
11.15 ,,	*Snaefell* (twin-screw)	1,368	1910	Cammell, Laird and Co.
11.45 ,,	*Douglas* (single-screw)	820	1889	Napier's.
12.15 p.m.	*The Ramsey* (twin-screw)	1,622	1895	Denny.
2.0 ,,	*Empress Queen* (paddler)	2,140	1897	Fairfield Co.
2.30 ,,	*Mona's Isle* (paddler)	1,595	1882	Caird's.
3.0 ,,	*Peel Castle* (twin-screw)	1,473	1894	Denny's.
3.30 ,,	*Fenella* (twin-screw)	1,881	1881	Barrow S.B. Co.
5.30 ,,	*Ben-My-Chree* (second trip).			
6.30 ,,	*Queen Victoria* do.			
11.45 ,,	*Prince of Wales* do.			
Midnight	*Snaefell* do.			
1.30 a.m. Sunday	*Mona's Queen* do.			

Such a service, carried out without a hitch, is, one would imagine, quite unprecedented over a distance of eighty miles of sea, and the transport of so many persons, without the aid of any previous discipline, is a matter which should have great military importance ; but, so far, I do not see that any notice has been taken of this aspect of the performance.

Round the World in Thirty-five Days.

Mr. Mears has accomplished his task and arrived at New York on the 6th August, having accomplished the circuit of the globe in 35 days 21 hours and 35 minutes, thereby beating the previous records for similar performances in the same latitudes. Mr. Mears was fortunate from the fact that his time table researches, before he started, enabled him to lay his plans in such a way that, without any delay *en route*, he could avail himself of the services of the *Mauretania* across the Atlantic, and of the new Canadian Pacific liner *Empress of Russia* on the Pacific. These things gave him, on paper, the possibility of lowering the record to the extent proposed. Fortune favoured him and he carried his paper itinerary into actual movement. He appears to have lost eighteen hours on the Siberian railway through a wash out at Ekaterinburg ; but this delay was not sufficient to cause him to lose the *Empress*, thanks to the way in which the Japanese railway manager rushed him across Korea, and catching her, he was all right. Landing at Vancouver on the 3rd August, he was hurried across the American continent, arriving at St. Paul, Minnesota, by 9 p.m. on the 5th, and being at New York at 10.10 p.m. on the 6th—according to programme. It may be well, for the sake of the future, to point out that one large London daily paper, owing to the repetition of an obvious misprint, recorded the statement that the voyage was accomplished in thirty-two days. The mistake is obvious now. But if not noticed it may, in a few years' time, when another adventurer seeks to reduce the time still further, cause a certain amount of confusion

Combinations and Arrangements.

It is interesting to note that certain Brocklebank steamships, which had been re-named in accordance with the nomenclature of the Shire Line, have now been restored to their original Indian designations, which were, of course, in harmony with those of the rest of the Brocklebank fleet, where all steamships are called by Indian names. The reason for the change of name at the present time is the fact that the agreement between the two Companies has expired by effluxion of time and is not being renewed. The Shire Line is, of course, in touch with the combination which is headed by the Royal Mail Company, and since the now denounced agreement was reached the Brocklebank Line has made a close alliance with the Anchor Company. By the non-renewal of the agreement it would appear that the former parties to it have now each retired to their main bodies, and that thus a small link between the Cunard-Anchor group and the Royal Mail-Shire combination is finally severed.

It should be noticed that the Donaldson Line was, on the 8th August, registered as a private limited company with a capital of half a million sterling. The signatories are all of the Donaldson family, and the registration is evidently undertaken for purely family reasons.

Hudson's Bay.

Modern science and enterprise are about to bring into close touch with the rest of the world the hitherto inaccessible region of Hudson's Bay. It has been determined to make a practical sea-port of Port Nelson, where piers and warehouses are to be constructed, and also to make it the starting place of a railway which is to extend for some 400 miles into the Hinterland. Nelson has been chosen after some deliberation, another possible port, Churchill, having also had some claims to be the place for development. A flotilla of some eight vessels has now either arrived at or on its way to the Bay, carrying with it men and materials for the commencement of the big schemes promised. Amongst the stores shipped are a complete wireless installation, and thus, soon after the vessels reach their destination, Port Nelson will be in instant touch with Ottawa, and, through Ottawa, with the rest of the world.

The "Mount Oswald."

Questions have been asked in the House of Commons as to the intentions of the Government in relation to the finding of the Court of Inquiry into the disappearance of the British steamship *Mount Oswald*. The facts seem to have been these:—The vessel in question sailed from Baltimore for Hamburg on the 20th February, with a crew of twenty-four hands and a cargo of 4,340 tons of grain. After passing Cape Henry she was never heard of again. It appeared that the vessel had been away from Europe for some time, and that she had, previous to her loading the cargo at Baltimore, been at Mobile, where she had been ashore. After this grounding, she had been surveyed, and the surveyors had recommended that she should be dry-docked. The recommendation of dry-docking was not, however, followed out and it was said that when she left Baltimore there was some leakage in the forepeak. It was also said that when the pilot left her in Chesapeake Bay the cargo was not la hed. It seems certain that a couple of days after sailing unu ually severe weather would be encountered, and that in all human probability the ship foundered under its stress. Certain letters were produced from the master to his wife, and in them there was refere ce to the state of the ve sel, and a fear was expressed that she might not make the passage. For some reason, which does not appear in the published reports of the inquiry, the Court seems to have gone out of its way to express its gratitude to the owners of the *Mount Oswald* for producing these letters, a thing which, under the circumstances, is unaccountable, for they were, of course, legally bound to produce everything which could possibly throw any light on the causes of the loss. Evidence was adduced from former members of the crew to show that the master was not a sober man, and inferentially to discredit the letter in which he spoke of the need for dry-docking and the suggestion to his wife that he could not obtain permi sion to have the dry-docking done. The Court was of opinion that a leaky condition of the bottom after the stranding might well have contributed to the loss, and whilst not feeling justified in attributing the los to any wrongful act or default of the owners, considered that they had to say the least committed a grave error in judgment in not having the vessel dry-docked at New York. The que tions in the House of Commons were directed to a certaining whether a prosecution of the owners was contemplated. The President of the Board of Trade did not satisfy his questioners when he told them that he had been advi ed that no pro ecution would lie. Under the finding from which we have quoted, it will be seen that a pro ecution was impo sible—a "grave error of judgment" does not amount to such an offence as is cognizable by the law. The ca e is, however, a warning as to the need for obeying the recommendations of surveyors, whilst it is also remarkable for the fact that these aspersions were made on the character of the master, and made in the teeth of the principle, enunciated at the *Titanic* inquiry by Mr. Butler Aspinal, K.C., as at the very root of the practice of the Courts, *viz.*, that charges should not be levelled against those who had died at the post of duty and were no longer able to be present to answer for themselves. The story is a very unpleasant one; but there can be no proceedings in a criminal Court, and it is only in certain eventualities that it can be heard of again before any tribunal.

THE MANCHESTER MUNICIPAL SCHOOL OF TECHNOLOGY.—The annual journal published by this school contains a record of the investigations undertaken by members of the teaching staff and stu lents of the school, and comprises within its pages much valuable information on a wide variety of subjects, and indicates research into matters which are of importance to the marine engineer and have a bearing directly or indirectly upon the machinery under his charge. Even such a subject as the treatment of cotton yarn, which is dealt with in the journal, has an interest for him, as it has been discussed in the case of condenser tubes found to be wasted at the ends and pitted into holes, how far the cotton packing was responsible for the wastage—due possibly to a corroding element used in the manufacture of the cotton cord and not thoroughly removed. The use of fibre packing rings is becoming more general, and it will be useful to note if a reduction of corrosion in the tube ends follows.

THE FIRST TRIPLE-TURRETED WARSHIPS

"Dante Alighieri" and "Viribus Unitis."

THE distinction of being the first nation to design and complete a warship carrying three guns in a turret belongs to Italy—the birthplace of so many notable era-making designs and naval innovations—while the kudos of having originated the idea must be awarded to Admiral Cagni, who proposed the triple turret to the Italian Naval Construction Board in 1905. The suggestion was worked out and included in the designs for a 16,000-ton battleship in 1907, but it was not until 1909 that the *Dante Alighieri* was actually commenced at Castellamare, the keel-plate having been laid on June 6th.

The *Viribus Unitis*, the first of Austria's four "Dreadnoughts" to be completed, was commenced a year later and although she also carries twelve 12-in. guns in four triple turrets, the disposition of these is very different from that of the Italian ship.

For whereas the *Dante* can only bring three guns to fire fore or aft in the axial line, the *Viribus* brings six guns to bear over similar areas, the grouping of the turrets being after the U.S. *Michigan* style with the second and third raised to superfire over the first and fourth. Both ships have a twelve gun broadside, but there can be no doubt but that the *Viribus* is the better arrangement of turrets, the training areas of the two inner turrets being more extensive, each turret having a turning arc of 300°.

Concerning the advisability of mounting more than two guns per turret much has been written, and even now there seems a diversity of opinion as to the actual results obtained from the triple mounting on trial. Briefly the arguments for and against are as follows:—

Pro. 1.—Saving of weight, as in mounting twelve guns only four turrets are needed instead of six.
2.—Economical construction, as the ship can be shorter and the engines and boilers more easily arranged when the amidships sections are free from gun mountings.
3.—Facilitated control, as the guns are only in two groups.
4.—Superior concentration of fire, as the three guns might be fired simultaneously.
5.—Augmented fighting power, as it is possible to accommodate more guns on shipboard per the triple than per the double turret.

Con. 1.—Liability of three guns being put out of action through a turret jambing, instead of only two.
2.—Lateral movement of the turret increased when a side gun is fired.
3.—Rate of fire diminished, so that three guns cannot fire faster than two.
4.—Blast effects.

The above are the chief desiderata, although of course the lists might be prolonged.

Now as to results: Granting all the pros, the cons, only have to be considered.

As regards 1; this can be answered by the simple statement that if six turrets are in action it is more likely that one will be jambed than if only four were exposed to fire, and the likelihood of three guns being placed *hors-de-combat* by one blow is no more than that of a couple of the six double turrets being similarly wrecked.

2. In actual practice the theories advanced by "Nauticus" and the "Rivista Marittima" were found not to be substantiated, and instead of the turret turning 4° when a lateral fire was fired instead of only 2°, as in the case of twin mountings, the movement was found to be even less than in previous Italian ships. The guns in each turret were also fired simultaneously with a greater elevation than would be given in actual practice, and the heaviest charges and projectiles employed, with completely successful results.

3. It is claimed that the average rate of fire of each gun can be maintained, but exact figures are lacking.

4. No bad effects have been experienced in either ship and the following description of the trials of the *Viribus* as given by Rear Admiral Geza Dell' Adami von Tarczal of the Austro-Hungarian Navy throw considerable light upon the vexed question as to whether the occupants of the lower turret really feel any ill results from the super-firing guns.

"After the guns had been tested individually a full salvo of all twelve, loaded with battle charges, was fired on the broadside, without causing any damage to the ship itself or equipment. After this the second and third turrets were trained dead ahead and astern and the three weapons in each loosed off simultaneously. The men in the two lower turrets were somewhat apprehensive as to the effect on themselves of having three guns, with an aggregate energy of something over 142,100 foot-tons, fired a few feet above their heads, but the discharge caused them not the slightest inconvenience nor did it affect the lower turrets in the least." "When these trials were over," he adds, "the crew, elated at the success of the venture spontaneously broke forth into ringing cheers." This description has been here recorded since it would seem to settle the controversy for good and all as to the effects of super-firing.

In passing it might be recalled that a report was circulated at the time of the trials, which claimed exactly the opposite results; the ahead firing was alleged to have thrown the upper turret out of alignment and severely shaken the gun-numbers in the lower turret. These statements were, however, officially contradicted, and since nothing but satisfactory accounts of the *Viribus* have been forthcoming since her commission there is every reason to credit her with being a successful ship.

All of which seems to prove that the triple turret is a practicable proposition. Russia and the U.S.A. have adopted it, and France has gone even further in the effort of concentration and grouped her guns four in a turret, and yet our own Admiralty fight shy of the idea, and the Germans are generally believed to have dropped it after experiment. In our case the necessity for its employment has not yet arisen as we have no ships carrying more than ten guns, increase in calibre having always replaced increase in number in the Navy.

It will be interesting to see how this year's battleships carry their ten 15-in. pieces all the same. Will there be five turrets, or will the American *Oklahoma* system of two triple and two twin turrets be utilised? It must be borne in mind that Messrs. Armstrong have designed a three-gun mounting—indeed, in certain quarters it is alleged that they took a prominent part in the designing of the *Dante*—so that the step could be made from the old to the new grouping without loss of experimental time.

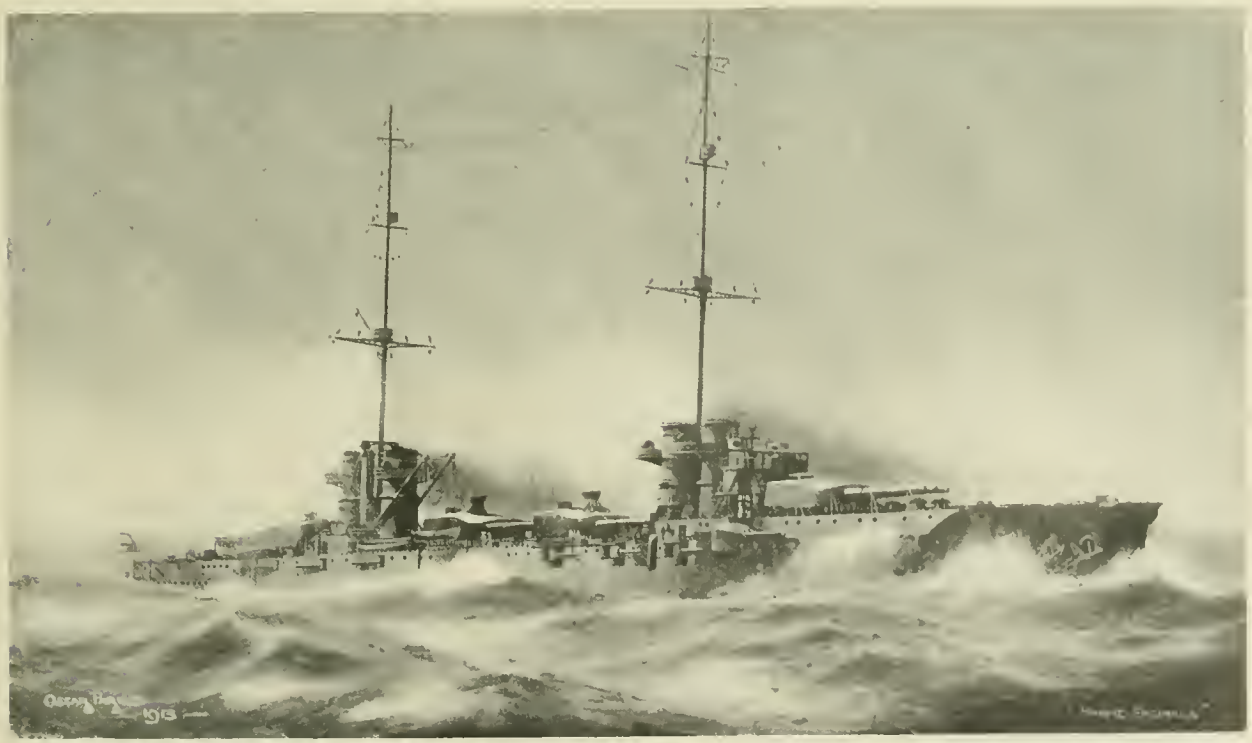
To continue the description of the *Dante Alighieri*, however. Her dimensions are:—Length over all 550 ft., beam 87½ ft., draught 28½ ft., giving a normal displacement of 19,400 tons. This is some 1,000 tons more than was originally calculated, owing to the ship drawing 16 inches more than was designed.

The twelve 12-in. guns are forty-six calibres long, and fire an 850-lb. projectile with an initial velocity of 2,900 f.p.s. giving a legend penetration of 17½ in. Krupp cemented armour, at 5,000 yards. These are mounted in 9-in. turrets, all three guns being on the same level, and not as was at one time suggested when the middle one was to be the apex of a triangle of which the outside guns were the base angles. One turret is on the forecastle, two are amidships, with training arcs limited by the superstructure, and one aft—a similar arrangement to that of the Russian "Poltava" class. All have 9-in. armoured bases, and three twelve-pounder quick-firing guns are grouped on the roofs.

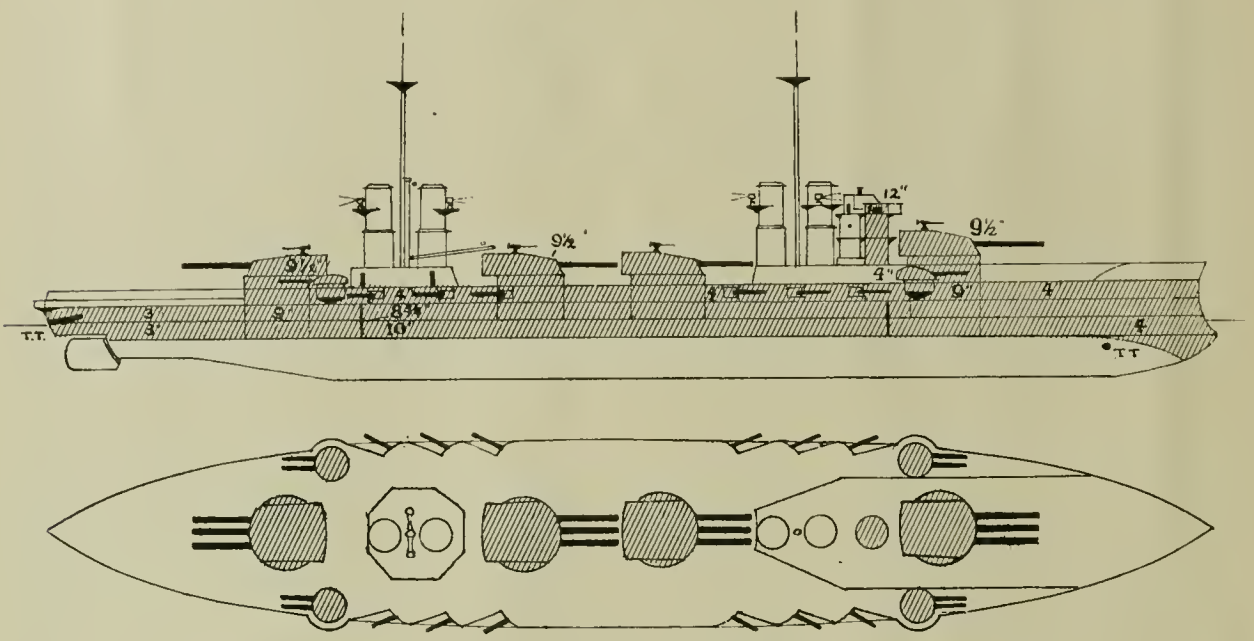
The secondary battery of twenty 4·7 in. guns is disposed in batteries and turrets behind 4-in. armour. As will be seen from the plan there are two small dome-topped twin turrets fore and aft and four widely separated batteries of three guns whose recessed ports allow of considerable bearing ahead and astern. The small turrets do not seem happily placed, as the big guns fire directly over them when trained on the beam; but as both sets of guns will not be in action together—the small piece being purely anti-torpedo attack—the increased arcs of fire resulting from the end positions of the twin 4·7-in. guns more than atones for any harm that might result from their proximity to the 12-in. during battle. For after a general action it is very doubtful whether any of such thinly armoured gun positions would survive in any case.

The torpedo offence consists of three tubes, one above the water line aft and one up forward submerged on each side—the positions are marked T.T. on the plan. Ordinary 18-in. Whitehead torpedoes are discharged.

Like most Italian designs, thickness of armour has been sacrificed to the area covered, with the result that except for small areas on the forecastle and main deck aft the whole hull is armour covered. Along the water-line for some



The Italian Battleship, *Dante Alighieri*.



Plan of the Battleship *Dante Alighieri*.

230 ft. amidships the belt is 10 in. thick, thinning off to 7 in. by the end turret bases and continuing forward to the bows as 4-in. and stern as 3-in. There is additional depth forward to reinforce the ram. Above this the lower deck side is 10 in. to 7 in. amidships with 4-in. ends, and along the battery the armour is 4 in. There is the usual protective deck which is 2½ in. to 1⅝ in. thick and this is reinforced at the bows by the ram armour. Only one conning tower is fitted, and this is 11 in. to 12 in. thick.

The three prominent features of the design are gun-power, complete armouring and speed, and in the latter the Italian designers have achieved their usual success. Fitted with Parsons turbines of 26,000 nominal h.p., designed to give 23 knots, she registered 21,000 h.p. and 21 knots at ⅘ power, and 35,000 h.p. and 24·5 knots on the full power eight hours' trial. With the exception of our "Invincible" class the *Dante* is probably the fastest capital ship up the Straits.

Her boilers, twenty-three in number, are of the Blechynden water-tube type. At present there is no standard type as in the German Navy, where the Thornycroft is universally fitted, and Yarrow, Belleville and Babcock have been fitted in recent ships. The normal fuel supply is 1,000 tons with 2,500 tons maximum; no oil fuel is used.

Owing to the spacing of the engine rooms necessitated by the positions of the amidships turrets, the funnels are grouped in pairs with pole-masts between them, an arrangement which gives the ship a distinctive appearance which is easily recognised. The searchlights are on platforms round the funnels, and it will be noticed that the boat-derricks are swung from uprights connected to the main mast.

Her cost was £2,250,000 and she is the sole representative of her type.

Like her Italian opposite number, the *Viribus Unitis* is the first Austrian "Dreadnought" to be completed. Constructed at the Stabilimento Tecnico, Triestino, from the designs of Chief Constructor Sigfrido Popper, in the excellent time of twenty-six months, she demonstrates the rapid growth of the Austrian capabilities for producing the largest ships. Of the type two more have been launched and one is still on the slips, the *Tegetthoff* and *Prinz Eugen* being under construction at Trieste and No. VII. at Fiume.

Owing to lack of experience some miscalculation as to the weight of the guns and turrets had to be compensated by economies elsewhere in the structure, so as not to increase the draught. She still draws 1½ in. more than was intended, however, and displaces 22,000 tons at full-load. She measures 495 ft. pp. (520 ft. over all) by 89½ ft. beam by 27 ft. mean draught.

Her twelve 12-in. guns are disposed in four 11-in. (12-in. in the sister ships) turrets, two fore and two aft, each with a 300° training arc. Manufactured by the Skoda Company on the Krupp model, they are 45 calibres long, weight 54½ tons and fire a 992-lb. projectile with a 2,623 f.s. velocity, which will penetrate 18½ in. K.C. armour at 5,000 yards. The difference in projectile weight from the Italian and British models is noteworthy, and raises the broadside to 11,904 lbs. as against the 10,200 lbs. of the *Dante*. Her secondary armament of twelve 6-in. guns (45 cal.) is carried along the main deck behind 6-in. armour. The end guns only have direct axial fire. Eighteen 2·8-in. q.f. pieces are also carried, twelve being mounted, three on each turret top, as in the *Dante*. Originally these were to have been on the superstructure, and it is worth passing comment to observe how the British practice of placing the small guns free from obstruction on the turret-tops is being adopted abroad, what time we are reverting to the superstructures for their housing, having abandoned the turret-top from the *Neptune* onward.

Like the *Dante*, the *Viribus* is almost completely armoured and carries nothing thicker than 11-in. plates. The main belt is very deep and extends for some distance below the water-line; amidships it is 11-in. thick, thinning to 7-in. under the turrets and 4¾-in. at the extremities. Above this is the 8-in. lower deck side with the 6-in. battery on top, while the 2-1¾ in. protective deck encloses the vitals.

There are two conning towers, that forward being unique in its girth and 12 in. thick (14 in. in the sister ships), and surmounted by an armoured range-finder. Aft there is a similar instrument, and also on each side amidships by the boat derricks. There are four submerged torpedo tubes, one in the bow and stern and each broadside, the model being the new 21 in. torpedo.

Steam is generated in Yarrow boilers (Babcock type in No. VII), as has been the case in practically all the recent Austrian ships, and with Parsons turbines of 25,000 designed H.P. a speed of 21 knots was anticipated, which was exceeded by ⅘ knots on trial. The coal supply is 900-2,000 tons, plus oil fuel.

Eleven searchlight projectors are fitted, mounted on the bridges, masts and special platform amidships. The twenty-two boats include two big motor pinnaces, and these are manipulated by central derricks after the usual Austrian pattern.

Both masts are hollow and used as ventilating shafts ; the funnels are very wide and are set in with their greatest diameter athwart ships to lessen broadside target. It will be noticed that the ship is without the usual bow-sprit—the sign-manual of Austrian war vessels.

The cost of the *Viribus* has been £2,525,000 and it is anticipated that these figures will be exceeded in the sister ships. She and the *Dante* are compared with contemporary ships carrying 12-in. guns in the following table, from which it will be seen that the *Dante* achieves almost as much on her displacement as the huge *Moreno*. Of the lot the *Kawachi* can only bring eight big guns to bear on each beam and the *Courbet* ten, out of twelve ; all the rest have full twelve gun broadsides. So far as figures can speak, the table certainly shows that the *Dante* and *Viribus*, by their triple turrets, have accommodated an armament which other vessels only carry on several thousand tons greater displacement.

COMPARATIVE TABLE.

Name.	Russia. *Poltava.*	Germany. *Kaiser.*	U.S.A. *Wyoming.*	France. *Courbet.*	Japan. *Kawachi.*	Italy. *Dante Alighieri.*	Austria. *V. Unitis.*	Argentine. *Moreno.*
No. in Class	4	5	2	4	2	1	4	1
Displacement	23,000	24,500	26,000	23,000	20,800	19,400	22,000	27,940
Designed H.P.	42,000	25,000	28,000	29,000	26,500	26,000	25,000	39,500
Speed	23	21	20·5	20	20·5	23	21	22·5
Armament	12 12″ 16 4·7″ —	10 12·2″ 14 6″ 12 3·4″	12 12″ 21 5″ —	12 12″ 22 5·5″ —	12 12″ 10 6″ 12 4·7″	12 12″ 20 4·7″ —	12 12″ 12 6″ 18 2·9″	12 12″ 12 6″ 12 4″
Torpedo Tubes	4	5	2	4	5	3	4	4
Armour belt	10″	12¾″	11″	10½″	12	10	11″	12″
Lower deck side	8″	7″	10-8″	7″	9″	8¾″	8″	9-6″
Big Guns	12-10″	12″	12-8″	9″	9″	9½″	11″	12-7″
Secondary	5″	7″	5″	7½″	6″	4″	6″	6″
Fuel	1000/3000	1000/3600	1500/3000	950/2700	900/2500	1000/2500	900/2500	1600/4000
Launched	1911	1911	1910	1911-12	1910	1910	1911-13	1911

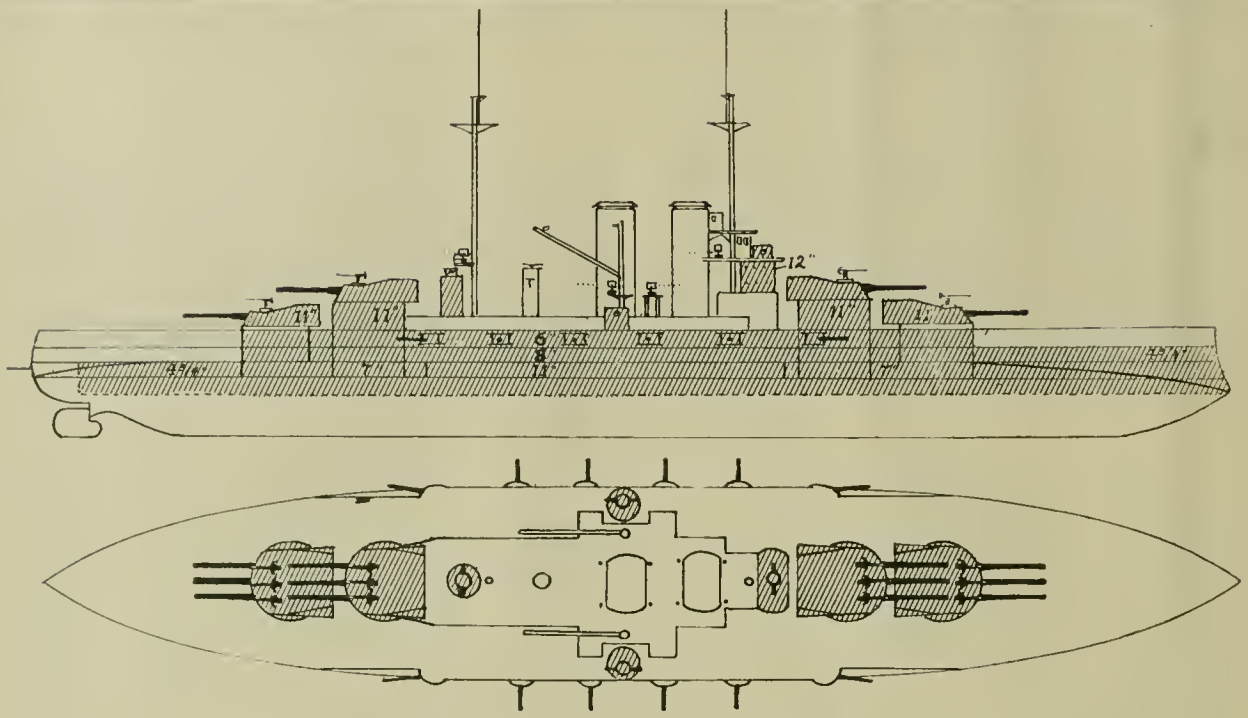
Austrian Battleship, *Viribus Unitis.*

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondents.)

Portsmouth Dockyard.

ALTHOUGH this yard is not specially referred to in the Report of the Select Committee of the House of Commons on the Navy Estimates, it may take credit for the general commendation which it shares with the other establishments. In connection with Vote 8, the Committee refer to the difficulty of comparing accurately the cost of dockyard work with that carried out in the private yards, because the public establishments have no capital accounts, and the work carried on in them is of so varied a character that the apportionment of incidental charges amongst the


12"
11"
11"
11

cruiser were being lifted out when, owing to the breaking of a sling, one of them fell upon a labourer named Kent and killed him, while another labourer named Classon sustained a fracture of the leg. Kent was a man over sixty, but owing to his general health had been allowed to remain in the dockyard for another twelve months. It is not without regret that we have learned that the floating dock in the Medway is to be transferred to Cromarty. It has proved its value here on several occasions, and it may be hoped that it will not be long before it is replaced by another floating dock in the river.

Devonport Dockyard.

There was very little sign here that the manœuvres were in progress, although our port was included in the territory which was liable to attack, and preparations for its defence were made. But so many vessels cannot be away without leaving a void, and until the *Cornwall*, the cadets' training cruiser, returned—she was the first to get back, having been put out of action—there was an unusual quiet, even in the yards. By the end of the first week of the month, however, nearly every billet in the Sound and Hamoaze was filled again by the forty or fifty vessels which came in to demobilise or give leave. The depots and barracks have now filled up again, and there is a fair sprinkling of ships and small craft needing attention. The ships under construction are making good progress, although, of course, there has been delay, which is responsible for the rather longer period they have been on the stocks. The *Aurora* will be the first of the light cruisers to take the water, and will go afloat towards the end of next month. Her place is to be taken by a similar vessel, it is said, and that duplicates of all parts of the material, castings, etc., have been ordered to be sent here for the purpose. The interchangeability of any part is a great advantage, since, if there is trouble with anything for the first ship, a substitute is ready and delay is obviated. The *Warspite* will be launched in November, but there is a doubt if her successor of this year's programme will be laid down before the end of the calendar year. A matter which has formed the subject of much discussion here is the recommendation of the Select Committee of the House of Commons on the Navy Estimates to the Admiralty to consider the question of the employment of the Metropolitan Police in the dockyards and other establishments. It is pointed out that this system involves an expenditure of £109,558, in addition to a contribution in aid of the Police Pension Fund of £24,200, and they think that some more economical plan might be introduced. The view generally taken here seems to be that, whatever may be the case at the Hospitals, it would be very unwise to try some other system of policing the dockyards and those establishments where any secrecy is essential. A very careful selection is made of the constables sent to the yards, and their duties are highly responsible. They are not too well paid as it is, but it would be very risky to try some cheaper substitute. No doubt reservists and pensioners would be quite as trustworthy, but they have no constabulary training nor any of the special experience which is so necessary in connection with the yards. We are to have some foreign visitors shortly, the Japanese cruiser *Kongo* having, in fact, just arrived at the moment of writing. She is on her way to the Far East from the Vickers yard, Barrow, and is to coal here on the 27th. She is certain to arouse a good deal of interest during her stay. Some Italian men-of-war are also expected, and their presence will be the more interesting, because Italian ships do not often come to this port.

Sheerness Dockyard.

While the other yards experienced a certain sense of loneliness during the manœuvres, with so many of their attached vessels mobilised and away, Sheerness was busier than at any other time of the year. This was due in part to its being the headquarters of one of the fleets, the vessels of which came in, sometimes in twos and threes, sometimes in a very big bunch indeed, to replenish with coal and oil. It says something for the resources of the port that every demand was met, and that there was no hitch in any of the arrangements. The quantities of coal shipped must have been enormous. It was a pity that the weather conditions were not entirely favourable; indeed, they were very bad on the day that the Red Fleet sailed. After this experience, however, the Nore must be looked upon as a base of first-class importance, even though it may not build battleships. It is certainly ahead of some of its rivals to the westward, in so far as torpedo craft, including submarines, and the flying wing of the service is concerned. We have already the aerodromes at Eastchurch and Grain, and now there is to be another at Hoo. This is a quaint old-fashioned place inland from the Isle of Grain, and between the Thames and Medway. In fact at one time the Mill on the high ground of the Hundred of Hoo was a seamark for both rivers. The airmen do not speak of these establishments as aerodromes, but that at Hoo is for airships, as that at Grain is for aeroplanes. There are to be two hangars or sheds, each over 500 feet long and 100 feet high, as well as all the repair shops and other things necessary. The place is to be "taboo" to strangers, and the railway station at Hoo is being enlarged in readiness for the traffic which may be expected. Since the manœuvres, there have been a good many ships here to give leave or to change their crews. The *Vixen* has come into the yard for a retubing refit, and the *Arab* for the repair of the damage she sustained by collision at Grimsby.

Pembroke Dockyard.

It is a long time since there were so many vessels in Milford Haven as assembled there prior to the manœuvres. Probably there were more than at any period since the days when this was one of the principal bases for the mimic wars in the 'eighties of the last century. However, they did not stay long, and we were soon back again into our usual condition, or the condition which has ruled since the ships of the Eighth Battle Squadron were sent here. Since last month, the *Fearless* has left, after a preliminary essay in the basin, and has gone to the Clyde for trials. After she has made them she will be commissioned, probably early in October. Her final departure from Pembroke will mark the end of an epoch almost, since she is the last of the light cruisers of the *Boadicea* type, the first of which was begun in 1907. On July 21st, the keel plate of our first light armoured cruiser of this year's programme was laid. She is to be 420 feet long, 41½ feet beam, and will displace 4,400 tons. She is to be launched as soon as possible, so that another vessel can take her place. This is not, as was at one time supposed, the second light cruiser of this year's programme, for that vessel will be laid down on the slip now occupied by the *Trefoil*, oil-carrier, so possibly the oiler *Turmoil* may follow the first cruiser. There have been many rumours, but nothing yet seems to be certain, except that without the working of overtime these ships are to be expedited as much as possible. The only vessel on which overtime is being worked is the *Nottingham*, now in process of completion. The refit of the *Swale*, destroyer, is complete, the *Dove* is in hand, and the *Antelope*, gunboat, will be taken in hand shortly. There is also the conversion of the *Heliopolis* into a hospital ship, which was begun last month. This work is being done instead of the construction of a new hospital ship. The targets, too, required for the battle practice of the squadrons, which will be in full swing by the time these lines appear, are all finished at last, and it is said that the men who have been employed upon them are to be put to other work, but more targets will be wanted before long, and the men themselves are said to be quite content to be employed in building them. Perhaps when the Inspector of Dockyards visits us, as he is expected to do, there may be further changes.

Institute of Marine Engineers.—Lloyd's Register Scholarship.—The examination for the Lloyd's Register Scholarship was held on July 8th and 9th at Glasgow, Hull and Newcastle. The results showed that the greatest number of marks was obtained by Mr. G. A. Brown (Graduate), now serving his apprenticeship with Messrs. D. Rowan, Glasgow, and to him the Scholarship has been awarded. He will attend Glasgow University during the forthcoming session. Owing to the next two candidates having reached a good percentage of marks, the Chairman of Lloyd's Register recommended to the committee that some recognition of their work should be made and it was agreed to give Mr. T. E. Dodds (Graduate), apprentice engineer, serving with Messrs. W. G. Armstrong, Whitworth & Co., Newcastle, a grant of £5, and Mr. Robt. J. Walker (Graduate), apprentice engineer, serving with Messrs. D. Rowan, Glasgow, a grant of £3 towards the purchase of instruments or books.

S.S. "TRIPOLITANIA."

THE interesting illustration shows this Italian steamer of 6,000 tons which was driven ashore under stress of weather on December 26th last year. Circumstances fortunately admitted of the vessel being guided to a sandy beach, so that she landed without much structural damage. The scene of the stranding is on the Cornish coast, on the Lizard side of Mounts Bay, round from Penzance *via* St. Michael's Mount and Prussia Cove, on the beach beyond which lie the remains of a former wreck and the now almost buried cargo of armour plate. Our first view of the *Tripolitania* was by means of a powerful glass from Penzance, and the interesting nature of the salvage operations invited further investigation. As soon as the weather served for the purpose, salvage operations were commenced by digging alongside the vessel with a view to forming a dock and canal to float her away into deep water; this was found to be impracticable owing to the sand silting up, and timber and chocks were brought into service; then by means of powerful jacks the vessel has been gradually moved out seawards. Thus with the aid of sea anchors it is hoped that she will be again afloat before the severe weather approaches. The process is a tedious one, but in the course of the early days of August the movement at the forward end was between 30 and 40 feet, while at the after end it was about 10 feet.

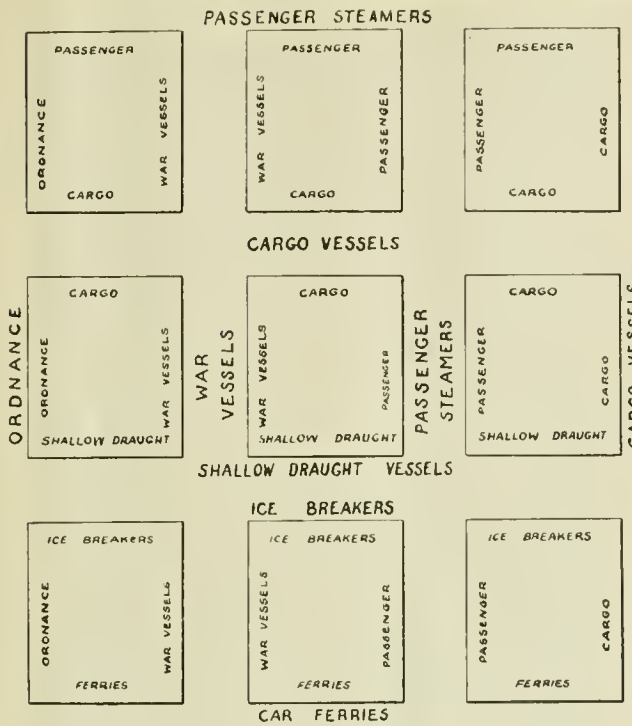
THE ARCH PRINCIPLE OF SHIP CONSTRUCTION.—Messrs. Furness, Withy & Co., Ltd., of West Hartlepool, have just placed orders for two cargo ships to be built on the arch principle of construction under the Ayre-Ballard patent, and each of a deadweight carrying capacity of about 3,400 tons. One of them will be built by the North of Ireland Shipbuilding Co., Ltd., at Londonderry, and the other by Messrs. Osbourne, Graham & Co., at Hylton, near Sunderland. The builders take a licence from Messrs. Swan, Hunter & Wigham Richardson, Ltd., and Mr. Maxwell Ballard, of Wallsend, who are the joint proprietors of the patent, and Mr. Ballard is supplying the designs. It is a matter of considerable interest to shipowners to know that, although the arch principle of ship construction is of comparatively recent date, yet during this year alone three vessels of this type have been taken in hand at various shipyards, which is striking evidence of the increasing popularity of the arch principle of ship construction.

The Italian Steamer *Tripolitania* (6,000 tons), stranded on the Cornish Coast

MARINE MOTOR NOTES.

THE stimulating effects which result from the races organized at various parts of the coast, extend from the craft specially built for speed and fitted with reliable high-class motors, to the boats designed for the pleasure of the owner and his friends, as even the owner of a pleasure boat is eager not to be out-distanced by another of similar features. The spirit of emulation is stirred and the boat of one season is disposed of in order to obtain another which will go one better the next season. The races in the Firth of Clyde have been conducted under good auspices during the past month or so, the weather having been favourable to a high degree, unlike what it was earlier in the season, and in the case of the 30-knot race from Gourock Bay to Tarbert on Loch Fyne, the entries were encouraging to the promoters and the results showed that the races were well contested and not simply an easy win for the best boat, in that the following boats were close behind. This is as it should be from the spectator's point of view, as well as from that of the commercial onlooker, who desires to see that progress is proceeding along the line of the engine builders, and is not confined to one specialist. The continental (Ghent Exhibition Committee and other organizers) races in the earlier part of the summer and the South and East Coast races now in course of preparation are all interesting events to note the marks of progress made season by season. There have been two or three accidents during the past few weeks, emphasising the precautions advised from time to time in dealing with the air compressors, as well as with the fuel oil in close quarters, and the generation of an explosive mixture in the passages not calculated to stand the pressure. The regulations which have been issued appear in some of the provisions to be so obvious as to be smile-provoking and akin to the directions given to a child as to touching hot bars with fingers, but it is not always the obvious that appeals and some of the accidents show that want of thought in dealing with high flash points has led to disastrous results. Discipline and that obedience to orders, which is inculcated by good training, bring about automatically attention to details and make for safety, and those about to take charge of machinery should undergo such a course of training before being entrusted with a position of responsibility. It is difficult to carry this into practice for all services. The fishing boats are manned by those who have to deal with their catches and at times all hands are engaged, hence the man who attends to the motor has to do so on these terms.

The paper read by Prof. Hopkinson, before The Institution of Mechanical Engineers, dealt with a very important aspect of internal combustion engines and showed that a great saving can be effected in not only running costs, but capital costs. The high temperature at which the explosive engine works demands a cooling arrangement, which in turn results in a loss of power and expenditure of energy without compensation apart from the cooling. It has been found from the experimental trials that a water injection spray effects the necessary cooling and the elaborate plant for jacket cooling can be dispensed with. The water spray has been used before and found beneficial in adding to the efficiency of the engine, but on the large scale advocated and in the results obtained, important changes may be forthcoming. The loss of the motor vessel *Scout*, owing to an outbreak of fire in the engine room, is an unhappy occurrence; it might have proved disastrous, but fortunately there was no loss of life. The *Scout* was running on the West Coast of Scotland, in the service so well rendered by Messrs. McBrayne. The fire broke out about half an hour after leaving Ballachulish and is presumed to have been caused by an ignition of paraffin. The motors were built to use crude shale oil and to develop about 200 h.p. on twin screws. The sailing barge *Arctic* with auxiliary motor and propeller, made its appearance for cargo, in the Victoria Dock, London, towards the end of August. During the past month or two, a number of small motor boats have found their way into the Victoria and Albert Docks, and the Port of London Authority might fittingly provide a motor-driven barge to go from ship to ship to receive ashes, as a substitute for the present antiquated arrangements.



THE GENERAL ARRANGEMENT OF A SHIPPING EXHIBITION.

IN most exhibitions in which each firm has a stand there is usually a total lack of plan; each stand is self-centred and takes no part whatever in a general scheme; the result is an utter confusion when it is desired to note the difference in design of, say, cargo vessels. Were it so arranged that by walking down a particular gangway between the stands we could see all the cargo vessels exhibited by the various firms, it would be possible to weigh up their relative merits. As it is, an isolated cargo vessel must be picked out here and there, the attention meanwhile being diverted by other types of vessel which intrude themselves on every side, and it is in vain that we attempt to group all the cargo vessels in the mind.

This lack of comprehensive planning has been the fault of many exhibitions, and in view of the forthcoming shipping exhibition to be held in London, a suggestion is offered below which, while leaving untouched the usual method of each firm exhibiting in stands, would make such an exhibition much more commercially useful and educative than is usually the case.

To illustrate what is proposed, only the display of models shown by the large firms is taken, but the principle could be applied with advantage to any stands which are given over to more than one class of exhibit. Stands with only one class of exhibit would do very well against the wall of the building, care being taken that those of all firms dealing with the same subject be side by side for ready comparison.

The diagram shows the general plan, which would only require that the exhibits of each firm be sorted out, and that each class of model be put along one specified side of the stand; the result would be that along one side of a passage we would have the one class of vessel. There would probably be discontinuities here and there, but in the main it ought to be possible to arrange that all of one type be in a line more or less continuous. Some of the suggested lines might have to be made up of two short lines given over to that number of small classes, additional probable exhibits being dredgers, floating docks, etc. The position of the stand of the exhibitor would be determined by the four classes of vessel he was showing. For instance, in the arrangement shown as an example, to a firm exhibiting war, passenger, cargo, and shallow-draught vessels would be allocated the central stand, and so on. An alternative method would be for the chief exhibitors, who have chosen certain stands, to indicate the nature of their exhibit, when the general scheme could be arranged to suit their display. The centre of the stand would be available for miscellaneous exhibits, or for those which do not fall into line with the requirements of the four sides in accordance with the general scheme.

For the convenience of visitors, and especially those from foreign countries (for whom we should cater as best we can), cards showing this general plan might be given *gratis* to all who enter the exhibition, and these cards might well be in the principal languages. This card plan, in addition to the labels on each exhibit being written in the various tongues, would enable the foreigner to get round the exhibition with pleasure to himself and, it may well be, with profit to the exhibitors. Another attraction for the foreigner would be an abridged catalogue in his own language, as it is too much to ask that the complete catalogue be in any other language than English.

We hope that the London Exhibition will make a feature of air-boat exhibits, as so many builders of yachts and motor-boats are taking up this branch of the work.

In the historical section it would be exceedingly interesting were it possible to exhibit in chronological order a series of models showing the salient points in the onward progress of war vessels, and perhaps one of our great shipping companies would do the same for the passenger steamer.

PROPOSED MEMORIAL TO SIR WILLIAM WHITE.

A committee has been formed for the purpose of raising funds to create a suitable memorial to the late Sir Wm. H. White. The Committee consists of representatives from the various Associations with which Sir William was connected. Meantime a memorandum has been issued, signed by the Presidents of the Institutions of The Civil Engineers, The Mechanical Engineers, Naval Architects, The Iron and Steel Institute, The Institution of Engineers and Shipbuilders (Scotland), North East Coast Institution of Engineers and Shipbuilders, The Institute of Metals, The Institute of Marine Engineers and the Chairman of Council of the Royal Society of Arts. Subscriptions are invited from all who are interested in the proposal and we feel sure that a large number of our readers will be glad to have an opportunity of assisting in the raising of the fund. Donations may be sent to The Secretary of the Institution of Naval Architects, 5, Adelphi Terrace, London, W.C.

THE SMOOTH-ON MANUFACTURING CO., of 8, White Street, Moorfields, London, E.C., have recently issued their Instruction Book No. 12, which tells all about the well-known Smooth-On specialities. They will be pleased to send a copy of the booklet to anyone writing for a copy.

THE CUMBERLAND PROCESS FOR THE PREVENTION OF CORROSION AND SCALE FORMATION.

PAPERS and discussions on the subject of corrosion of metals and the formation of scale have been many and varied since the days of the Boiler Commission, which sat more than thirty years ago, with the object of investigating the causes of corrosion in boilers and the remedies. Most of the papers and results of experiments have been referred to in our pages from time to time, including the value of electrical devices for the protection of boilers and condenser tubes. A process has recently been gaining favour, both in land and marine practice, which is claimed to be beyond question efficacious in preventing both corrosion and the formation of scale in boilers and surface condensers. This is called the Cumberland process, and is being worked by The Cumberland Syndicate, of 44, Charing Cross, London, S.W. Mr. Cumberland carried out a number of experiments in Australia and had the process tested in practice there, with such evidence of success that he determined to introduce it elsewhere. Accordingly he went to America and had several installations fitted, and more recently he has installed the process in the steamers of several well-known companies. The following list of corporations and companies shows the history of the growth of the process, commencing with the earlier installations :—

In America, The Canadian Pacific Railway Co., The New York and Brooklyn Edison Power Stations, The United States Navy and Brooklyn Navy Yard, The Erie Railway Co., and The Merchant and Miners' Steamship Co., have had installations fitted, in each case with satisfactory results, according to their reports. The report of Lieut.-Commander Frank Lyon, of the United States Navy Department, was of an eminently satisfactory nature, stating that the process stops corrosion and removes scale from the heating surfaces and also prevents it from forming.

Mr. Cumberland was then enabled to arrange for exhaustive trials with the White Star and Cunard Companies in connection with both boilers and condensers, and in each case he appears to have proved his assertion that he can both stop corrosion and prevent scale from forming. The ships chosen for the trial tests have now been running about a year with absolute satisfaction ; the old scale has been softened and most of it brought off and no new scale has formed.

In the experimental part of the trials in the laboratory, Professor Lyle, M.A., D.Sc., Professor of Physics to Melbourne University, says in his report : " My tests have been made with metals immersed in hot and cold salt water and also in dilute acids. In all cases I have found that the hurtful galvanic action can be suspended by a small expenditure of electrical power by Mr. Cumberland's process." In one case where the process has been in use it was stated in the report : " The Cumberland process is the only way of

Fig. II.

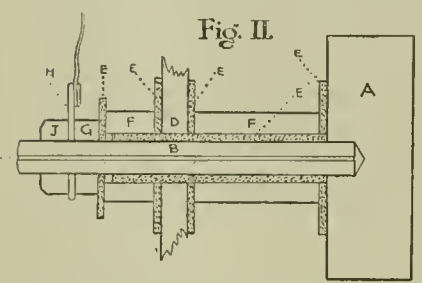
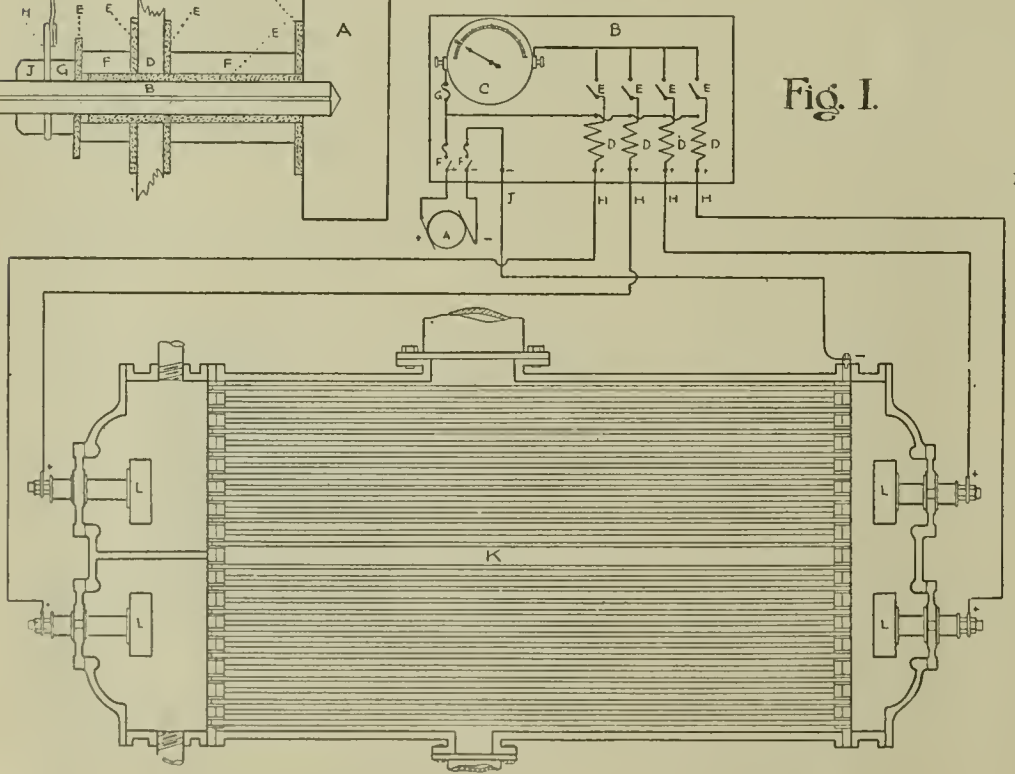


Fig. I.



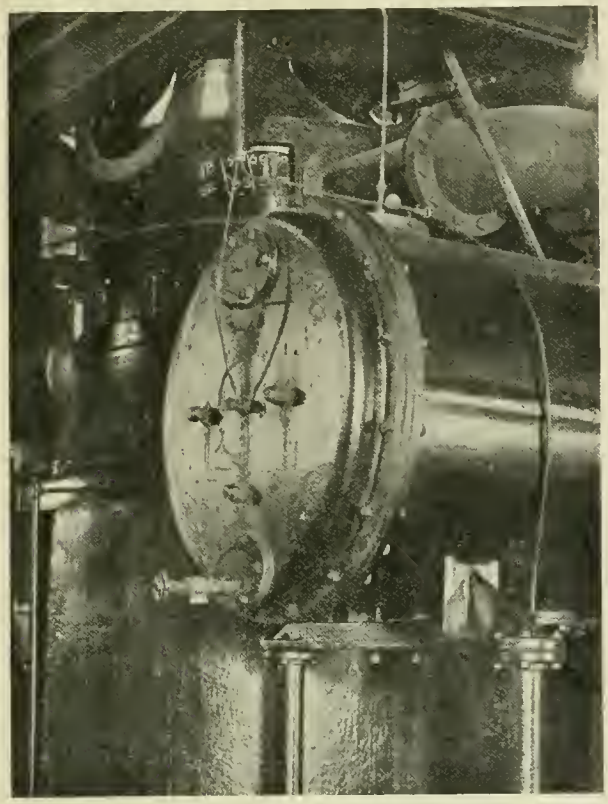
The Cumberland Process, showing Installation in Surface Condenser.

FIG. II.

A—Iron electrode.
B—Electrode support.
C—Tell-tale hole (indicates when electrode needs renewing).
D—Condenser end.
EEEEE—Rubber insulations.
FF—Insulating distance bushes.
G—Nut.
H—Contact lug.
J—Lock nut.

FIG. I.

A—Motor generator.
B—Switchboard
C Ampmeter.
DDDD—Adjustable resistances
EEEE—Two-way switches.
FF—Double pole switches and fuses.
G—Fuse.
HHHH—Wires from positive pole to electrodes.
J—Wire from negative pole to tube-plate.
K—Surface condenser.
LLLL—Electrodes.



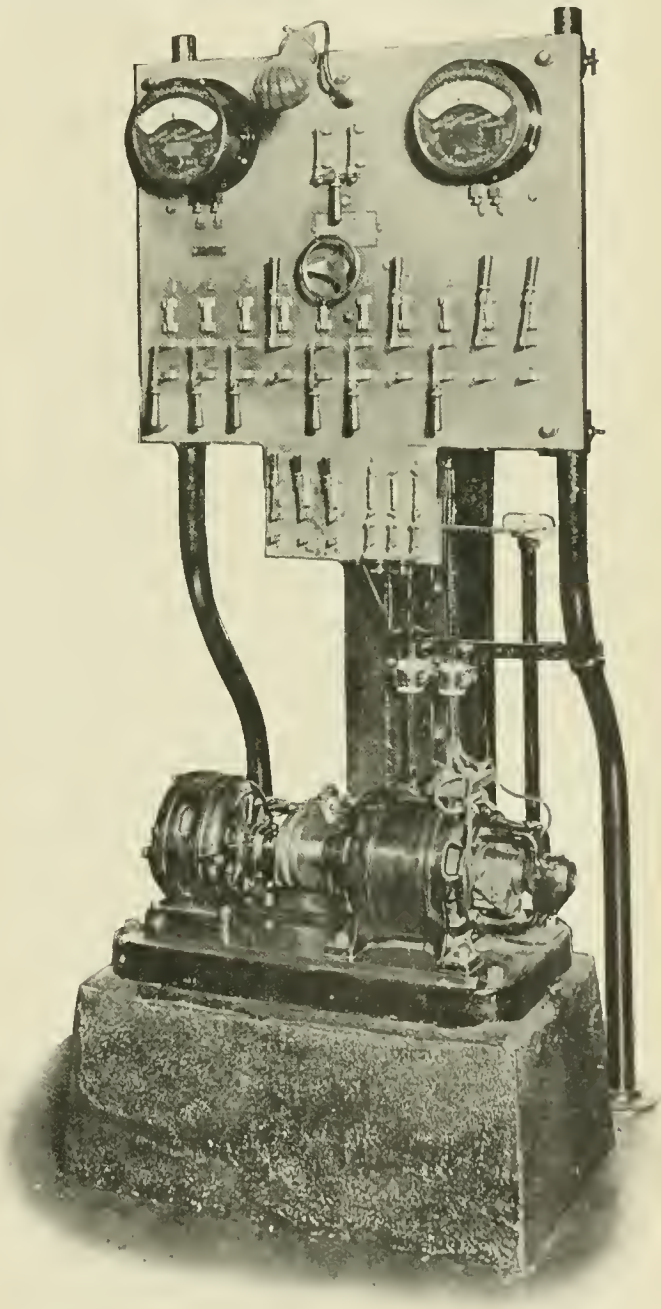
The Cumberland Process.
Installed Brooklyn Navy Yard, Brooklyn, U.S.A.

preserving the interior surfaces of water-carrying pipes and circulating systems."

The *Mauretania*, *Lusitania*, *Athenic*, *Laurentic* and *Celtic* have each been fitted with the Cumberland process, while on land, The Llanelly Electric Power Co., The City & South London Railway, Messrs. Coombe, Watney & Reid's Stag Brewery, Pleasley Collieries, Messrs. Emery & Co.'s Victoria Rolling Mills, Birmingham, and others have had installations fitted.

Orders are now in hand with the Syndicate for a large number of important installations, both on land and sea, including several large shipping companies and collieries and industrial firms.

The process, the apparatus for which is shown in the illustrations, is as follows: "Iron Anodes," carefully insulated, are immersed in the water contained in the vessel to be protected, and a measured and regular amount of electricity is supplied to each, controlled by separate resistance coils, the current being supplied by a direct current low tension (6 to 10 volts). The vessel to be protected is connected to the negative pole of the electric supply source, thus its affinity for hydrogen is controlled in accordance with the amount of current supplied. The current passes from the positive pole of the generator to the anode, through the water (which is decomposed by the current) and enters the metal of the vessel to be protected and there returning to the negative pole, liberates hydrogen on the surface of the metal of the boiler or the condenser tubes as the case may be. The action of the current is thus to attract the destructive oxygen and acids contained in the water to the anodes, where they form, in combination with the iron, oxide of iron, which is harmless and falls to the bottom of the vessel in the form of a fine dust, the beneficial and protective hydrogen being thus left to form on the vessel and prevent any scale or solids forming on the surface of the metal, carrying away at the same time into solution all grease, dirt and scale previously formed. As compared with the use of zinc, now common in ships, one amp. of current supplied to one electrode or anode is equal to 250 square feet of clean zinc, reckoning the current generated by one square foot of clean zinc as being ·004 of an amp. In the case of the Cumberland



The Cumberland Process.
Installed Brooklyn Navy Yard, Brooklyn, U.S.A.

process the effect remains constant, whereas in the case of zincs the beneficial effect slowly ceases until an actual reverse of polarity is arrived at, thus nullifying the intention of the fitting. The process is also a safe water alarm; the engineer-in-charge can thus always see what is taking place in each boiler or condenser and if the current is actively sufficient for the object in view.

The corrosion that has also been a source of trouble to engineers, at the propeller blades and on the stern frame, Mr. Cumberland, under a separate patent, claims to have overcome. The matter is now under consideration by the Admiralty, while several of the large shipping firms have also had their attention directed to it.

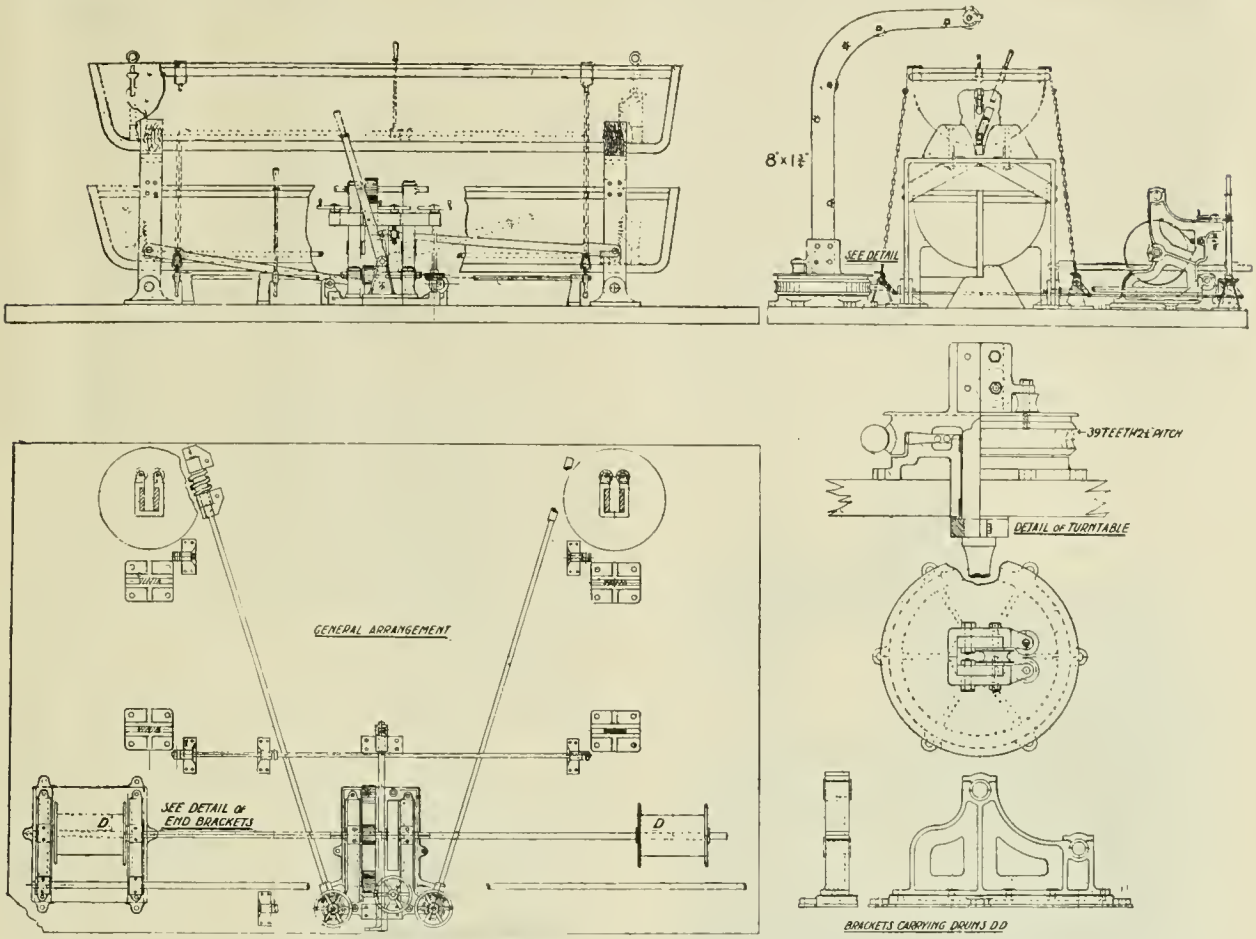
OIL v. COAL FUEL ON OCEAN LINERS.

The Union Company's "Niagara."

LIQUID fuel for steam raising purposes on board ocean-going steamers has received a further and pretty convincing testimonial as to all-round advantage over coal, from the results of trials under thoroughly representative conditions, made with the triple-screw steamer *Niagara* of the Union Steamship Company of New Zealand's fleet, the first vessel burning oil fuel and having a British Board of Trade certificate for carrying passengers. This fine vessel, 543 ft. in length, 66 ft. beam, 37½ ft. depth to upper deck, and of 13,500 tons gross, was built and engined by Messrs. John Brown & Co., Ltd., Clydebank, and was taken over by her owners in April last. Designed for the Company's service between Vancouver and Australia, with accommodation for 290 first-class, 210 second-class, 176 third-class passengers and a large amount of cargo, she plies between Sydney, N.S.W., and Vancouver, B.C., *via* New Zealand, Fiji and Honolulu. The cargo carried by the *Niagara* is worked from the holds by hydraulic hoists, an almost universal system on the company's passenger steamers. A large part of the hold space has been insulated for the carriage of frozen meat, butter, chilled fruit, etc. The accommodation for the first-class passengers is provided amidships, on main, upper, shelter, and promenade decks, the staterooms being arranged for one, two, three, or four passengers, while several groups of cabins have been arranged for family parties. On the shelter and promenade decks there are a number of one and two-berth cabins, fitted with bedsteads instead of the ordinary ship's berths. Two cabins *de luxe* are situated on the shelter-deck, close to the main vestibule. The first-class dining saloon, a spacious apartment with dining accommodation for 190 passengers, is situated on the upper deck amidships, convenient to the main entrance, and has a large well overhead. In the saloon the tables are all arranged for small parties. The first-class lounge is on the promenade deck, two decks above the dining saloon, and is arranged in small bays and cosy corners. The open well over the dining saloon rises through the centre of the lounge, and is lighted by a large dome on the boat deck. The library and writing-room is situated at the fore end of the first-class accommodation, on the shelter-deck, and is specially designed for the comfort of passengers who desire to pass the time quietly, small tables being arranged well apart from each other. The music room is on the forward end of the promenade deck, and a large dome overhead adds to the fine appearance of this apartment. The smoke-room is also on the promenade deck. A children's saloon is provided, and is decorated with interesting pictures and well equipped with games and toys. The second-class accommodation is arranged aft, with a dining saloon on the upper deck. This apartment, which has dining accommodation for 188 passengers, is handsomely decorated The music and smoking-rooms are situated above. The accommodation for third-class passengers is situated forward, and for these also good public rooms are provided. The heating and cooling is on the thermotank system, which ensures in the coldest weather at Vancouver a temperature of not less than 65 degrees Fahr. The thermotanks are designed to change the air, in any of the compartments to which they are connected, ten times per hour. The system also provides a continuous supply of fresh air to all the living quarters of the ship, which can be heated to any temperature. There are nineteen thermotanks in the installation, all of which are used for ventilating the first, second, and third-class accommodation, also for the officers' and crews' quarters. The lifeboat accommodation is more than ample to provide for all the passengers and crew. The propelling machinery, constructed by the shipbuilders, consists of a combination of two sets of reciprocating engines and a Parsons low-pressure turbine, supplied with steam by six single-ended and two double-ended cylindrical boilers, working under Howden's forced draught, and capable of giving the vessel a speed of 17 knots on service. She has specially constructed bunkers of ample capacity to carry sufficient oil fuel for the round voyage between Canada and Australia, and also to carry coal if necessary. The whole of the bunkers and Nos. 2 and 3 holds have been made air and oil tight up to the main decks. Heavy fore and aft bulkheads are fitted throughout, adding strength to the ship and ensuring safety. An emergency plant for lighting has been arranged on the boat deck, so that in case of accident light will always be maintained. Altogether there are over 2,000 lights throughout the ship. On her first trip to Vancouver from Sydney she used coal on her boilers, but on arrival there she took on board 4,000 tons of oil, and at Honolulu on the homeward run she took on board 350 tons additional. Throughout the passage oil fuel was used and an average speed of 15½ knots was maintained. Interviewed on the subject of the comparative merits of coal and oil as fuel upon the vessel's arrival at Sydney, the chief engineer, Mr. J. Dunlop spoke in a way most favourable to the latter. Its use not only saved a great deal of labour but gave a steadier steam pressure and a higher speed. The convenience and rapidity with which oil fuel could be taken on board was an immense advantage and its use dispensed with all the paraphernalia connected with coal firing: furnace fittings, fire-irons, wheel barrows, shovels, and the cinders and dust which were a constant source of worry below and on deck. The absence of dust and smoke was highly appreciated by the passengers. No hitch of any kind had occurred in the use of the oil fuel and it had proved more economical than coal. The records showed that the steam pressure with coal varied from 210 lbs. to 160 lbs., but with oil a steady pressure of 220 lbs. had been kept up during the whole of the return voyage. There being no fluctuations in steam pressure the revolutions were uniformly maintained, and greater speed resulted.

INTERNATIONAL ENGINEERING CONGRESS, 1915.—The Committee of Management of the International Engineering Congress, 1915, have pleasure in announcing that Col. Geo. W. Goethals, chairman of the Isthmian Canal Commission and chief engineer of the Panama Canal, has consented to accept the Honorary Presidency of the Congress and will preside in person over the general sessions to be held in San Francisco, September 20-25th, 1915.

JAPANESE SHIPBUILDING.—The report of the Japanese Mercantile Marine Bureau for 1912 is to hand. This shows that at the end of the year there were 2,844 steamers, of 1,386,534 tons gross, 8,192 sailing vessels, of 451,520 tons, and 21,817 junks, of 2,994,219 koku, on the register, an increase as compared with the previous year of 299 steamers, of 152,625 tons, and of 1,800 sailing vessels, of 37,800 tons, but a decrease of 826 junks, of 147,152 koku. Apart from junk builders, there are 216 shipbuilding yards in the country, and the number of vessels turned out was 142 steamers of 41,229 tons, and 216 sailing vessels, of 13,132 tons—increases respectively of 16,750 tons and 2,035 tons. The number of ships completed during the fiscal year with the grant of "shipbuilding encouragement certificate," in accordance with the Law for the Encouragement of Shipbuilding, was eleven—aggregating 50,550 tons; while ten vessels, of 49,450 tons, were granted the certificate, but were not completed within the fiscal year. A total of seventeen vessels, aggregating 73,540 tons, were granted the "navigation encouragement certificate" during the year, and there are now twenty-four lines coming under the direct control of the Subsidised Lines Department.



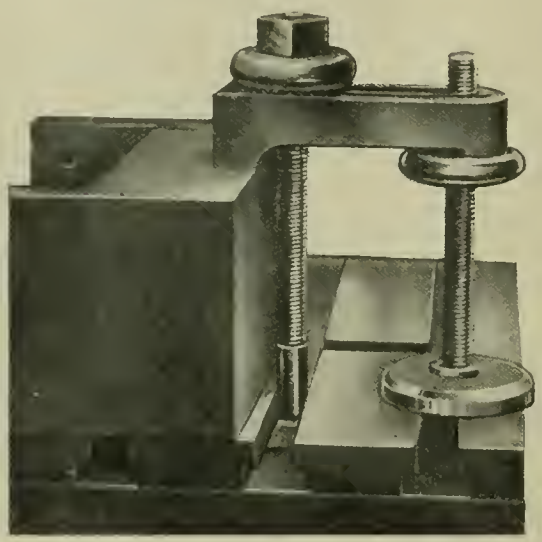
SCOTT'S PATENT BOAT-RAISING, LOWERING AND RELEASING GEAR.

THE necessity for a good, reliable gear for dealing with boats has been forced upon the attention of all seafarers for many years, and with much emphasis during a more recent time, so that the minds of those who know and appreciate the difficulties from practical experience have been at work to devise methods more or less ingenious to overcome the disadvantages of gears formerly in general use.

Our attention has been called to a simple type of gear for raising, lowering and releasing boats, which is herewith illustrated. In the case of new vessels in course of construction, special davits can be made and fitted to suit the arrangement shown. It will be seen that the davits are formed of two plates, secured to a standard base with a socket, and revolve on roller bearings. Between the plates forming the davits are fitted distance pieces and sheaves, in which single wire falls travel. The davits revolve independently of each other and are controlled or moved by means of a worm and worm wheel on each, the moving power being transmitted by means of shafts with bevel wheels actuated by hand. Guys are thus dispensed with for the davits, as the outward and inward movements are controlled and held by the gear in any position by the hand of the operator. The gear may be adapted to the ordinary form of davit, as the worm wheel can be fitted to the socket and keyed on in the usual way and the worm shaft secured in a bracket fitted alongside. The sheaves for the falls led to the winch for turning the davits can also be readily fitted to serve this purpose should the form of davit be of the ordinary type; the great advantage still remains that one man can work and control each set of davits, keeping all the movements under observation and minimise deck space occupied. The extended drums from the winch cheeks shown in the plan of the illustration can be kept close up to the winch, which may be placed in any convenient position on the deck so as not to encroach unduly and cause an obstruction, so long as the operating hand is under supervision.

As in large modern passenger steamers steam, hydraulic, electric or motor power is available and used for many purposes throughout the ship, one or other of these may be applied readily for actuating the boat gear, the lowering being done by means of a brake. It will be observed that two boats are shown in the elevation—but more may be so placed in tiers—one above the other; the chocks on which the upper boat rests are hinged forward and aft and

arranged to drop clear of the lower boat when the release bolt of the lever is moved. The grips and boat covers are released automatically by means of tumblers fitted on revolving shafts worked by a lever. The automatic boat release gear is simple and effective, while every care and attention has been paid to avoid any detail which might lead to risk of accident or a foul. The whole or part of the gear may be made and fitted to suit existing arrangements on vessels. One of the great advantages claimed for the Scott Gear is that the davits are swung out and a boat lowered in a few seconds by one man operating, and that further it is simple and effective for the purpose designed. The inventor, Captain T. A. Scott, has had an extended experience at sea, and his address is 15, Fairfield Road, Sundridge Park, Bromley, Kent.



A NEW ADJUSTABLE CRAMP.

THE expenditure of a small amount of thought is often the means of saving both time and money, and we think that our readers will agree, after examining the adjoining illustration, that the device is not only extremely simple, but is also an ingenious labour saver.

As the illustration shows, the device is a cramp for holding work on the table of any machine, and it is being put upon the market under the title of "The Fly-Wheel Adjustable Cramp," owing to the fact that the adjusting nuts are of fly-wheel form and can be consequently adjusted very rapidly by the momentum given to the nut. By the use of such a device, the usual collection of washers and packing pieces generally employed are entirely obviated, as any length of holding-down bolt and any height of packing for back support can be effected in a very few seconds. The cramp is being put upon the market by Messrs. Price and Belsham, of 52, Queen Victoria Street, London, E.C., and it may be of interest to note that in conjunction with the adjustable device illustrated, some ingenious holding-down bars or finger-plates are sold, which add materially to the utility of the device as a whole.

BOARD OF TRADE EXAMINATIONS.

June 24th, 1913.—LONDON.—*Ex. 1st Class :* C. Coppinger, E. King, F. Pickthall. *1st Class :* W. Calderwood, B. Dyer, L. Miller, C. Thompson, J. Wilde. *2nd Class :* D. Jones, W. Jones, J. MacDonald, R. McKillican, N. Rattray.

HULL.—*2nd Class :* T. Hodgson.

BRISTOL.—*1st Class :* R. Wilson. *2nd Class :* J. Evans, F. Hicks.

SUNDERLAND.—*2nd Class :* W. McIntosh.

GREENOCK.—*1st Class :* W. Hewitt, R. Richardson. *2nd Class :* A. Hardie, A. MacLaine, A. Symon.

WEST HARTLEPOOL.—*Ex. 1st Class :* C. Elliot.

LIVERPOOL.—*Ex. 1st Class :* H. Griffiths. *1st Class :* J. Cook, E. Owen. *2nd Class :* H. Hickson, J. Potts, S. Samuel.

LONDONDERRY.—*1st Class :* A. Connor, J. Kirkpatrick.

NORTH SHIELDS.—*Ex. 1st Class :* T. Bennett, B. Grainger, J. Johnson, A. Macnab, R. Mitchell. *1st Class :* H. Bissett, J. Clough, G. McCallum, J. Pringle, J. Sharp, W. Smith, T. Smythe, J. Spence. *2nd Class :* R. Callcot, R. Havery, A. McNaughton, R. Wilson.

ABERDEEN.—*1st Class ;* W. Mitchell. 2nd *Class :* J. Cameron, D. Ogg.

July 31st, 1913.—LONDON.—*1st Class :* D. Dunn, C. Fowling, A. Turner. *2nd Class :* W. Anscombe, R. Burns, H. Godfree, F. Millward, G. Plows, J. Selmes, A. Stephens, J. Tait.

BELFAST.—*1st Class :* R. Cummings, S. McNamara, J. McWhirter.

FALMOUTH.—*1st Class :* A. Sara.

LEITH.—*1st Class :* J. Galloway. *2nd Class :* G. Duncan, J. Mudie, J. Thompson.

GLASGOW.—*1st Class :* P. Campbell, P. Gardner. *2nd Class :* J. Baker, G. Richmond.

LIVERPOOL.—*1st Class :* J. McEwan, C. Wilson. *2nd Class :* J. Anderson, F. Brodie, F. Kermode.

NORTH SHIELDS.—*1st Class :* T. Armstrong, A. Miller, W. Morgan, R. Sanderson, W. Smith, W. Tulip. *2nd Class :* W. Allan, R. Blair, L. Fibezer, G. Fulcher, S. Hewison, E. Stobart, J. White.

SOUTHAMPTON.—*1st Class :* L. Churcher, H. Tooks. *2nd Class :* J. Andrews.

CARDIFF.—*1st Class :* V. Ferguson. *2nd Class :* W. Stewart

August 7th, 1913.—LONDON.—*1st Class :* C. Hardy. *2nd Class :* H. Garrett, A. Kahler, W. Pruddah, J. Robson.

LIVERPOOL.—*1st Class :* G. Davies, J. Kennaugh. *2nd Class :* J. Anderson, R. Bell, A. Brown, S. Fitzgerald, J. McNair, T. Moore, A. Stott, H. Tottenham.

GLASGOW.—*1st Class :* R. Williams. *2nd Class :* S. Fleming, W. Hindmarsh, H. Turner, P. Weston.

NORTH SHIELDS.—*1st Class :* J. Douthwaite, G. Thurlbeck, J. Swinney. *2nd Class :* F. Chhapkhanawalla, S. Jopling, J. Taylor.

August 14th, 1913.—LONDON.—*1st Class :* P. Vignes. *2nd Class :* J. Johnson, C. Mitchell, R. Tupper.

GREENOCK.—*2nd Class :* H. Macaulay, J. McBride, K. Macdonald.

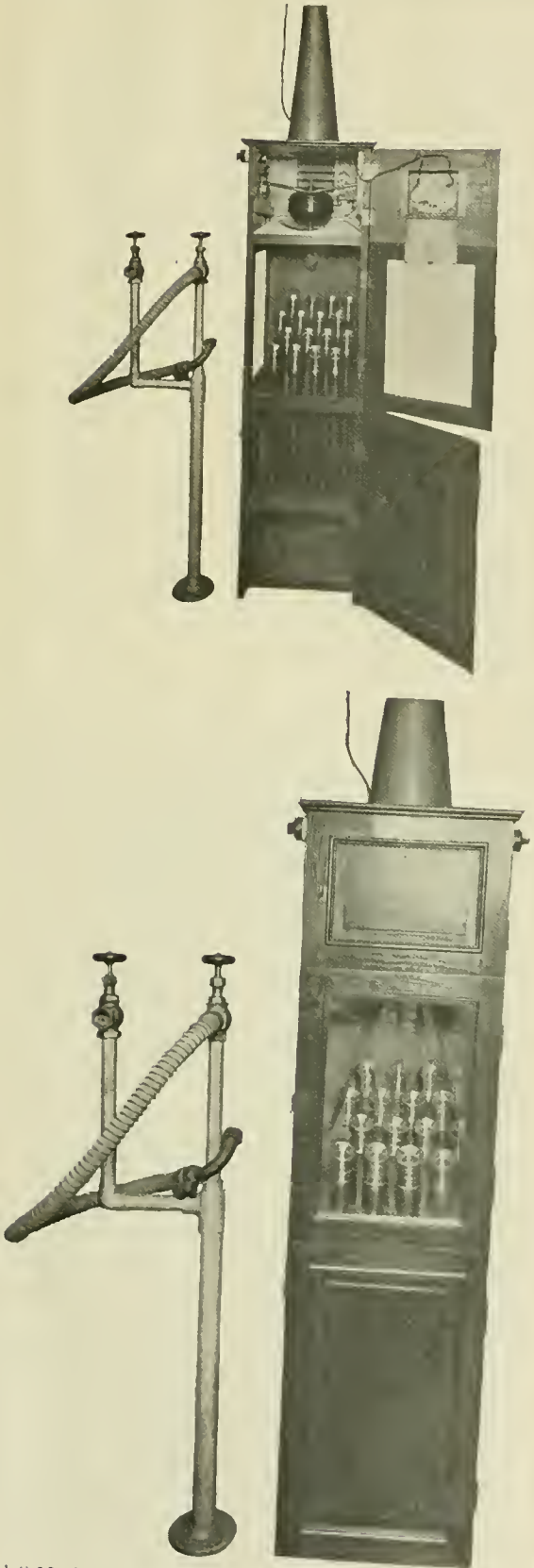
NORTH SHIELDS.—*1st Class :* T. Monks, J. Waddel. *2nd Class :* G. Clark, F. Colpitts, G. Donald, J. Firman, W. Mathison, C. Mattinson, J. Thompson.

LIVERPOOL.—*1st Class :* J. Daugherty, D. Williams, R. Wright. *2nd Class :* J. Angus, R. Braithwaite, H. Brown, H. Flood-Jackson, L. Howard, J. Milne.

DUBLIN.—*2nd Class :* J. Simpson.

HULL.—*1st Class :* W. Blackman. *2nd Class :* S. Coward, W. McVeigh, W. Marshall.

FLOATING DOCK FOR THE UPPER BOSPHORUS.—News has been received at Wallsend that the large floating dock built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., and owned by the Société Anonyme des Docks et Ateliers du Haut-Bosphore, has safely arrived at its destination, namely, Stenia, in the Upper Bosphorus. The dock is 490 ft. long, 95 ft. broad, and has a lifting capacity of 8,500 tons. It is of the bolted sectional type, which combines the advantages of the great longitudinal strength of a box type of dock with facility for self-docking.



"Rich" Marine Fire Indicating and Extinguishing Apparatus—open and closed—as fitted on the Hamburg-American Company's *Imperator*.

THE "RICH" MARINE FIRE INDICATING AND EXTINGUISHING SYSTEM.

ONE of the most interesting items on board the *Imperator* is the apparatus comprising the "Rich" Marine Fire Indicating and Extinguishing System, which consists of two indicating instruments and two steam standards for extinguishing, all fitted on the bridge and illustrated in the adjoining diagrams, Fig. 1 showing the device closed and Fig. 2 open. All holes and spaces on board that are to be protected from fire are connected to these instruments by means of 1½-in. diameter galvanized-iron steam piping. The ends of the piping in the instrument are fitted with screwed couplings, and the ends in the various holds, etc., are fitted with smoke receivers and placed under the ceilings. Above the ends of the pipes in the indicating instrument is fitted an electric fan which is automatically controlled by a clock which starts the fan every quarter of an hour and allows it to run for four minutes; this fan exhausts all the air above the tube ends and induces a draught up through the tubes, and should any smoke accumulate in any of the holds connected with the instrument it will be seen rising from the pipe end. Should this be the case all that is required to extinguish the fire is to open the case and couple the flexible hose, which is attached to the steam standard in connection with the boiler on the pipe end that the smoke is seen rising from, and turn on the live steam from the boiler.

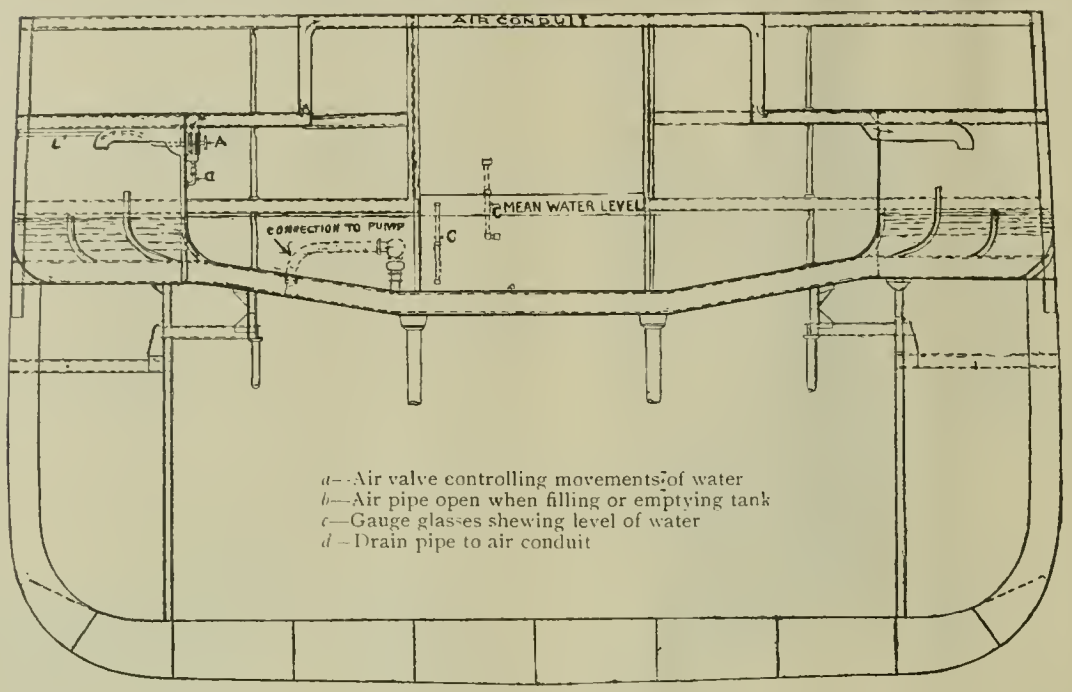
The "Rich" system of fire indication and extinction, which was described and illustrated in our December, 1912, issue in an article comparing the different systems used on board ship for fire extinction and fumigation, has been installed on a considerable number of vessels belonging to the leading steamship lines, for instance, the Cunard Co.'s *Mauretania*, *Lusitania*, *Franconia* and *Laconia*. The *Aquitania*, now being fitted out, will also be furnished with the "Rich" system. Vessels belonging to the Standard Oil Co., *viz.*, the *Seneca*, *Kennebeck*, *Schuykill* and *Hudson*, have also been so fitted.

Messrs. F. S. Dudgeon, Ltd., of 30, Great Saint Helens, London, E.C., are the agents for this system, which is of American origin.

FRAHM ANTI-ROLLING TANK INSTALLATION ON THE "IMPERATOR."

SO much interest has been created of late years in anti-rolling systems that we feel sure our readers will welcome any information on the subject, and we illustrate in the adjoining diagram a cross section of the s.s. *Imperator*, showing the arrangement of the anti-rolling tank as installed according to the Frahm system.

The anti-rolling tank in this ship is situated between decks G and J, and the bulkhead dividing boiler-rooms Nos. 2 and 3 forms one of the chief supports of the structure. The cross-connection between the side basins has been utilised to form the bottom of the swimming bath. The installation consists of three elements adjoining one another, capable of being worked independently or in different combinations as may be desired. The total length of the side basins is 33·5 ft. and their width each side is 16 ft. The



Cross Section through the Frahm Anti-Rolling Tank on Board the *Imperator*.

weight of water required is 300 tons, or only about 0·60 per cent. of the load displacement. It will be seen on reference to the diagram that with the exception of the air-valve controlling the movements of the water there are no mechanical fittings, the whole device being simple in construction and automatic in operation. As is well known, the application of Frahm Tanks dispenses, of course, with the necessity of fitting bilge-keels, thus reducing the possibility of damage while docking or in navigating narrow channels. We understand that the two sister-ships to the *Imperator* will likewise be fitted with anti-rolling tanks of a similar description. We have dealt at such length in previous articles with the weight of water required and the marvellous effect of a small weight of water reducing the amplitude of oscillation to such a remarkable extent that we shall not repeat our observations under this head.

ODDIE PATENT SIMPLEX PUMPS.

IN our issue of July, 1910, we gave a full illustrated description of the Oddie Simplex Pump, in which not only were the manifold advantages pointed out, but the general method of operation was fully set out. The problem of making a satisfactory simplex pump has always been a difficult one to solve, and the solution devised by Mr. Oddie is not only simple, but extremely ingenious. It is interesting to note that the merits of the pump are such as to commend themselves to the builders of the *Imperator*, and the owners of the Hamburg-American Line, and we illustrate in Fig. 1 one of the main feed pumps, the dimensions of which are 20 ins. × 14 ins. × 32 ins., and in Fig. 2 one of the heater pumps of the same dimensions. It will, of course, be clearly understood that although the pumps appear to be in pairs, as a matter of fact each pump is entirely independent of the other. The heater pumps are used to raise the water from the hot well to the heater, whence it flows to the feed pumps and is forced by them into the boilers. The installation on the *Imperator* consists of four double heater pumps and four double feed pumps. The heater pumps can be used as feed pumps when so desired, and the feed pumps are also arranged to deliver the water through a surface water heater direct to the boilers, if necessary.

It is interesting to note that the pumps were designed for an average speed of about eleven double strokes per minute, but it has been found from practical experience, under ordinary running conditions, they can be run at double that speed absolutely quietly. So great is the reserve power now found to be at hand in this installation of Oddie Pumps that it is contemplated taking out three of the four sets of heater pumps as being quite superfluous. It would appear, therefore, that had the superiority of the Oddie gear been thoroughly recognised and appreciated at the time of settling on the auxiliary plant of the vessel, the sizes of the pumps would have been reduced instead of adopting the sizes of pumps hitherto used as a basis for the sake of caution.

BOILER EXPLOSIONS ACT ENQUIRIES.

The bursting of a stop valve chest on board the *Araguaya* while the ship was at Southampton and of another on board the *City of Lincoln*, about a month previously, while on the Australian coast, serves to show the risks run by engineers in the execution of their duty, the investigations help to reveal the causes. The bursting of the chest on the *City of Lincoln* resulted fatally, as the third engineer and five East Indians were killed. The ship was under way and an escape of steam at the chest called the attention of the engineer on watch, who reported the matter to the chief engineer. He proceeded to examine the chest; on seeing the escape of steam he gave orders to stop the fan and cease firing, and afterwards

proceeded to shut the stop valves, but before carrying his intention into effect, the chest burst; on examination it was found to be broken through the branch piece. The thickness was designed to be $\frac{7}{8}$ in. but it was found to be on the tension side from $\frac{60}{64}$ to $\frac{63}{64}$ in. and on the compression side from $\frac{48}{64}$ to $\frac{52}{64}$ in., while on the tension side, where a jet of steam appeared to have found an outlet, there was a blow-hole about half-way through the metal from the inside, added to which the metal was slightly porous. In the *Araguaya*, the bursting of the chest was evidently due to water hammer, induced by the opening of a drain cock while the pipe range to which the cock was connected was under steam. Three boiler cleaners were scalded and died from the effects. One boiler was under steam for port service and the others were being cleaned. The pipes, after being tested to 430 lbs. water pressure, were being re-covered with non-conducting material and had steam on to heat them for this purpose. Previous to steam being admitted the pipes were drained and the stop valve opened gently, steam was in the pipes for a night and during the early morning while they were being covered; the chest burst about a quarter to eleven; apparently water had gathered in the pipe and being set in active motion with steam behind it, force was gathered until the accumulated energy expended itself against the chest and brought about the disaster. The chest appears to have been a sound casting and free from defects. Another case came under our observation some time ago when the conditions were similar in respect to the water pressure test, the pipes being re-covered and steam being on for heating them through the stop valve of one boiler during the night and early morning. The stop valve chest burst, but happily without any further disaster, no one being even slightly injured.

KING'S DOCK, SINGAPORE.

THE King's Dock which has just been completed and officially opened in Singapore for the Singapore Harbour Board, formerly the Tanjong Pagar Dock Company, at a cost of over £400,000, is the largest dry dock in the Far East and will add very materially to the facilities of the Board for docking work.

The dock is 870 feet in length by 128 feet in breadth, with an entrance width of 100 feet; it can, however, be divided by a central caisson into an inner and outer portion which can then dock ships of 502 feet and 346 feet in length respectively. The depth over the outer cill is 34 feet at high water spring tides and 24 at extreme low water; the inner cill is dropped lower so as to admit of sufficient working space under the bottom of any ship which may be long enough to reach over the central division. The dock is constructed entirely of concrete, with the exception of the two entrances, which are of Cornish granite ashlar. The altars throughout the work are of moulded concrete blocks, the remainder of the facework is worked up with fine concrete masswork. Three rows of granite keel block courses also run throughout the dock under a corresponding number of heavy timber keel blocks, the remainder of the floor is of mass concrete.

Two ships' caissons, built by the Thames Ironworks Company are provided; they are identical in size and are accordingly interchangeable; each weighs 826 tons, including ballast.

The dock is filled through two culverts 7 feet high by 4 feet 6 ins. wide and is emptied through two culverts 10 feet by 6 feet leading to the pumping station where two of Messrs.

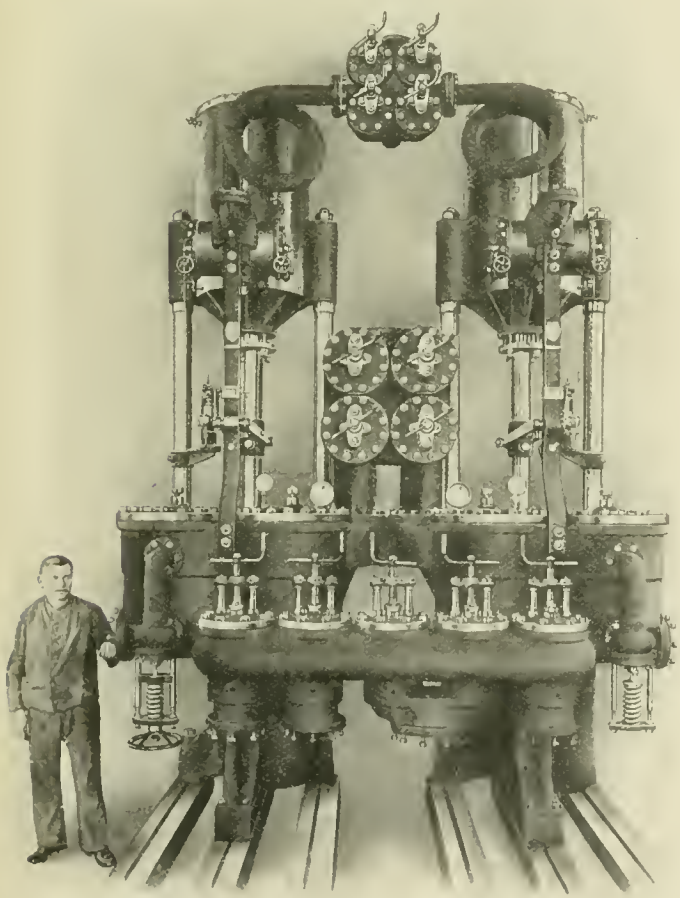


Fig. 1.—Oddie Simplex Main Feed Pumps supplied for the *Imperator*.

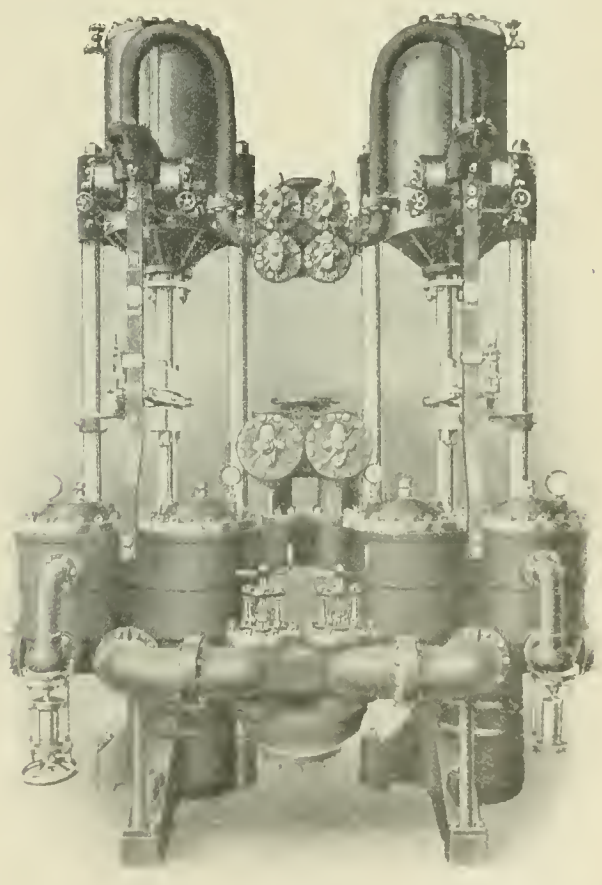


Fig. 2.—Oddie Simplex Heater Pumps supplied for the *Imperator*.

Gwynnes' 60-inch centrifugal pumps are installed. Each of these pumps has two suctions 30 inches in diameter, and is direct coupled to a compound condensing engine of about 1,100 i.h.p. with cylinders 24 inch and 46 inch diameter by 24 inches stroke. Steam is supplied to the pumps at 160 lbs. pressure by three Babcock & Wilcox boilers, each capable of evaporating 12,300 lbs. of water per hour.

These pumps are capable of emptying the dock, which contains 22,000,000 gallons of water, in less than two hours against a maximum lift of 39 feet.

The dock equipment comprises four 10-ton and eight 5-ton capstans by Messrs. Clarke, Chapman & Co., a 5-ton crane by Messrs. Babcock & Wilcox, a 15-ton crane by Messrs. Stothert & Pitt and penstocks by Messrs. Glenfield and Kennedy; all of which appliances are operated electrically by power derived from the Board's own power station.

The Engineers for the works are Messrs. Coode, Matthews, Fitzmaurice & Wilson and Mr. J. R. Nicholson, C.M.G.—Mr. F. C. Fforde acting as resident engineer.—The works were carried out under contract by Messrs. Topham Jones and Railton, Ltd., Westminster.

CORROSION OF CONDENSER TUBES.

THE second Corrosion Report, read at the Ghent Meeting of the Institute of Metals on August 28th, and summarized herewith, is held by the Corrosion Committee of the Institute of Metals, under whose supervision the report was prepared, to be of special importance and to merit special publicity. For more than three years the Corrosion Committee have been at work on the subject of the corrosion of condenser tubes, the Committee's Honorary Investigator being Dr. G. D. Bengough, M.A., of Liverpool University. The first report was presented at the London meeting of the Institute in January, 1911, and consisted of a general review of the then available world-knowledge of the subject of the corrosion of non-ferrous metals, both in its practical and scientific aspects.

Having reviewed the field open for research, Dr. Bengough proceeded to experimental work at Liverpool with the aid of a specially-constructed condenser, built as a result of funds provided by generous donors. How well these funds have been expended is evident from the second report, which suggests clearly the lines on which the corrosion of condenser tubes can be combated. There still remains much work to be done, but, unfortunately, the funds at the disposal of the Committee are exhausted. It is hoped by the Committee that the publication of the report will result in their obtaining promises of additional financial assistance. Already many generous promises of further support have been made, including a donation of £200 and a first annual subscription of £100 from the Brass and Copper Tube Association; 25 guineas from Lloyd's Register; £25 from Messrs. Vickers, Ltd.; £10 from the Midland Railway Company, and several other donations, a full list of which will be published shortly. The Committee, however, are still in need of further promises to enable the work to be completed, and donations will be heartily welcomed by Mr. G. Shaw Scott, M.Sc., the secretary of the Institute of Metals, Caxton House, Westminster, S.W.

Introduction.

Details as to the nature of the practical problem have been ascertained from the enquiry forms returned to the Institute of Metals. These forms were widely circulated by the Institute amongst users of condenser tubes. Twenty of the most complete have been selected and the information contained has been tabulated. Important points brought out are:—(1) The erratic nature of the trouble. Different users give as the normal life of a tube periods varying from 4 to 25 years. (2) The nature of the deterioration is in the great majority of cases dezincification, which results finally in a rotten and pitted tube. This type of corrosion is called "selective corrosion." Occasionally tubes fail by localized "complete corrosion," *i.e.*, by the rapid removal of both Cu and Zn over certain areas. (3) It is not possible to correlate the failure of tubes with the presence, or nature, of the electric lighting system. (4) There is no obvious connection between any definite locality in a condenser and the frequency of dezincification.

The results of an examination of the tubes sent with the forms and the scale on them are given; they throw little light on the causes of corrosion, and only indicate in a general way the nature of the problem involved. The chemical and physical condition which exist in a condenser are considered; also the possible variations from point to point in the same condenser. It is the variations in these conditions which determine the locality at which corrosion commences. Engineers in charge of condenser plants are not usually in a position to study them, and consequently the information obtainable from them is of limited value. There is an almost entire absence of experimental work showing how the speed and type of corrosion vary as the conditions vary. Consequently it has been considered advisable to carry out a detailed laboratory investigation into the matter.

Section I.

Laboratory Investigation on the standard tubes of the Corrosion Committee.

Composition of Standard Tubes.

	1. 70 : 30 Brass.	2. 70 : 28 : 2 (Pb). Special Brass.	3. 61 : 39 Muntz Metal.	4 70 : 29 : 1 Admiralty Brass.
Copper	70·21	69·94	60·90	71·18
Zinc	29·17	27·60	38·21	27·28
Tin	—	—	—	1·07
Lead	0·27	2·08	0·46	0·28
Iron	0·27	0·28	0·33	0·21
	99·92	99·90	99·90	100·02

Summary of results of experiments carried out at 20°C.:—

(1) Corrosion at this temperature is always of the approximately complete type and is slow and uniform. (2) Carbon (in the form of coal, graphite and coke), sand, copper and a number of other bodies have, *per se*, little or no effect on the speed or type of corrosion. They do not give rise to any appreciable electro-chemical action. (3) Certain basic salts of zinc and ferric oxide appear to have some slight accelerating effect, but it is too small to be practically important. (4) An increase in the concentration of the sea-water increases the speed of corrosion; a decrease in concentration decreases it. The type of corrosion is unaffected (but see below). (5) The order in which tubes resist loss of weight is as follows:—

1. Muntz metal (loses least weight).
2. 70 : 28 : 2 alloy.
3. 70 : 30 brass.
4. Admiralty metal.

(6) An increase in the speed of the water increases the amount of corrosion. (7) Jelly tests have given inconclusive results. (8) "Selective corrosion" could not be obtained at 20°C., except by the employment of free acid, or by the use of diluted seawater for very long periods of time. (9) A detailed account is given of the nature of the reaction which takes place during the process of corrosion. (10) No evidence is forthcoming that "flaws" and "spills" have any influence on corrosion at the ordinary temperature.

Most of the experiments carried out at 20° were repeated at 40°.

(1) Corrosion at this temperature is of a distinctly "selective" type, *i.e.*, the zinc is removed from the metal in larger amount, proportionately, than the copper. (2) This action is by no means uniform, but begins at certain points and spreads outwards. The causes which determine the distribution of these points is discussed in detail. The action is inherent in alloys of the types considered, given the presence of sea-water and suitable temperature conditions. (3) The order of resistance to "selective corrosion" at this temperature is:—

(1) 70 : 28 : 2 alloy (most resistant).
(2) Admiralty alloy.
(3) 70 : 30.
(4) Muntz metal.

(4) Sea-water diluted with its own volume of distilled water exerts a greater selective corrosion effect than ordinary sea-water. Concentrated sea-water stimulates complete corrosion, but represses selective corrosion. (5) The influence

of carbon particles, etc., was no greater than at the ordinary temperature. (6) The presence of zinc oxychloride on a tube gives rise to severe dezincification. Enquiries have shown that it is highly probable that temperatures of 50°C. and upwards are frequently attained in condensers. Consequently a series of experiments at 50° were conducted, mainly on 70 : 30 brass and Admiralty metal.

Results of experiments at 50°C.

(1) Corrosion is of the selective type, and is concentrated almost entirely on the zinc. Mere traces of copper only were removed from the tubes, except in the case of the Admiralty tube. (2) The action is severely localized. (3) The order of resistance to selective corrosion is :—

(1) Admiralty metal (most resistant).
(2) Muntz metal.
(3) 70 : 30 brass.

The last two tubes showed signs of dezincification in seven days. No signs of dezincification could be detected in the Admiralty metal in four weeks. (4) The total weight of metal lost is lower at 50° than at the ordinary temperature for equal lengths of time. If the water be aerated the weight lost is enormously increased, and is greater than at the ordinary temperature. (5) The effect of particles is the same as at the lower temperatures. (6) Dilute sea-water (as above) and concentrated sea-water act as at 40°C.

SECTION II.

Full details of the work carried out with the experimental condenser plant are given, and a comparison is made between the conditions obtaining in it and in an ordinary marine condenser. Three tubes of each of the standard compositions have been withdrawn and examined. The tubes themselves and the scale have been subjected to detailed examination. All the tubes show signs of dezincification with the exception of one of the Admiralty tubes, and one of Muntz's special brass. The extent and distribution of the areas of dezincification are considered in the light of the laboratory work. The agreement in the results obtained by the two methods of work is very striking.

SECTION III.

Some preliminary experiments on the nature and mode of action of electro-chemical protection methods are described, and the important part played by calcium carbonate scale is emphasized. A general discussion of the bearing of the whole of the experimental results upon the practical problem under the varying conditions met with in practice is appended, and some suggestions are made as to possible methods of preventing corrosion.

BOARD OF TRADE CERTIFICATES.

To the Editor of THE MARINE ENGINEER.

Sir,

I have read with considerable interest the article in your July number on "Engineers' Scholastic and Practical Experience," dealing with the new regulations of the Board of Trade regarding the Examination of Engineers, which come into force in January, 1915, and under which eighteen months' sea service will be required to qualify for each class of certificate, instead of twelve, as at present, a remission amounting as a maximum to one-sixth of the time being made to those candidates who attend a Technical School approved by the Board for the training of Marine Engineers.

I think the statement in the article that in training the certificated engineer there can be no fitting substitute for practical experience both in the workshop and the engine room will be agreed to by all, and few will in these days deny that practical experience can with great advantage be supplemented by technical instruction ; there is, however, one point which the writer of the article does not appear to fully realize, *viz.* :—that under the new regulations a candidate who receives the maximum remission of sea service allowable for attendance at a Marine School will nevertheless have to serve 25 per cent. longer at sea before being qualified for examination than heretofore, and other candidates up to 50 per cent. longer, there can, therefore, be no question that the value of the certificate as evidence of practical training and "finger-end experience" can be reduced by the operation of the new regulations.

With regard to the nature of the instruction which will entitle the candidate to remission, the regulation states that it must be "an approved course comprising general mathematical and scientific instruction at a Technical School recognised by the Board of Trade as suitable for the training of *Marine* (*i.e.* sea going) Engineers," and presumably before officially recognising a school the Board will take such steps as may be necessary to ensure its being of a suitable character and the approved course such as will be of practical benefit to the sea-going engineer.

I am, Sir,

Yours truly,

Chief Engineer.

London, 19th August, 1913.

[It was fully recognised that even with the maximum deduction of sea service there still remained the balance to the credit of experience, but it was generally agreed that the conditions now, as compared with thirty years ago, demanded the 50 per cent. extra qualifying sea service ; as this may be reduced by 25 per cent., it is important that it should be well spent and in a satisfactory way.—ED. *M. E. & N. A.*]

FOREIGN NOTES.

Austria.

ON 2nd August the s.s. *Laguna*, a large cargo-boat of shelter-deck type, without erections, built by the Cantiere S. Rocco to the order of Messrs. Navigazione Libera Triestina, Fratelli, Pollich, was launched. The vessel is of the following dimensions :—Length, 390 ft. ; beam, 54 ft. ; height, 32 ft. to shelter-deck. The 'tween decks are very high, about 10 ft., and a longitudinal graintight steel bulkhead runs fore and aft in the hold. The double-bottom and the peaks are reserved for water-ballast. The holds are clear of side stringers, and are five in number, with six large hatches. The crew is accommodated in a deck-house fitted on the deck aft, and the officers amidship. The triple-expansion engine, 26 in. by 42 in. by 70 in. by 48 in. stroke, has been supplied by The Clyde Shipbuilding Co., Ltd., Port Glasgow, and a speed of 11 knots and more is expected. A sister-ship, the s.s. *Spuma*, delivered to the same owners on 7th August by Cantiere Navale Triestino, Monfalcone, attained, on a four hours' trial, about 12 knots. The deadweight carrying capacity is about 8,300 tons. Two other ships were delivered on 2nd August, s.s. *Drava*, which we mentioned in our last issue, and t.s.s. *Marienbad*, a large cargo and passenger steamer 450 ft. by 56 ft. by 31 ft. 5 in. to main deck, built by Cantiere S. Rocco for the Austrian Lloyd. The vessel sailed on 1st August for her first voyage as the mail steamer between Trieste and Bombay. She is a splendid liner, of fine lines, and is a sister-ship of t.s.s. *Gablonz*, already in service. She was engined by the Stabilimento Tecnico, Triestino, with two quadruple-expansion engines, developing about 3,800 i.h.p. each, and served by eight boilers. The mean speed for twenty-four hours was 16·2 knots, as against 15 knots contracted for.

France.

The cargo steamer *Henriette* has been launched at the Chantiers de la Loire, to the order of the Compagnie de Navigation. Her deadweight carrying capacity is 2,800 tons, the length 86 m., beam 12 m., i.h.p. 1,100, and her speed will be 9 knots. She will be employed for the transport of coal, phosphates and ore. The cargo steamer *Victor Hugo* of 1,930 tons, has been sold by her owners to Norwegian shippers. The Chamber of Commerce of Boulogne has decided to have built a very powerful tugboat of 600 i.h.p., which is to be equipped for salvage work.

Germany.

The armoured cruiser *Seydlitz*, which is turbine propelled, developed on her trial runs on the measured mile the great power of 100,000 i.h.p., constituting a record as regards ships of war. The dimensions of the *Seydlitz* are, length 200 m., beam 28.5 m., and she has a displacement of 25,000 tons on a draught of 8·2 m. The *Java*, built at the Bremen Vulkan at Vegesack, to the order of the German-Australian Steamship Co. of Hamburg, has completed her trial runs very successfully. The *Java*, which has a wireless installation is a cargo steamer of 12,300 tons carrying capacity, and is 153 m. long with a beam of 19 m. Her propelling machinery is a quadruple-expansion engine of 5,000 i.h.p., giving to the vessel a speed of 13½ knots. Four boilers working with forced draught supply

the steam. The steamer *Madeleine Rickmers*, built to the order of the Rickmers Steamship Co. of Hamburg, has accomplished her trial runs. Her triple-expansion engine developed 2,000 i.h.p. and gave the vessel a speed of 12 knots. This steamer is fitted with a wireless installation and also a submarine signal apparatus.

The steamer *Posen* has been successfully launched by the Bremen Vulcan Co. to the order of the North German Lloyd. On a draught of 8·15 m., she has a carrying capacity of 11,000 tons and her length is 109·35 m., beam 17·98 m. Her six large cargo holds will be served by 19 derricks and winches. The *Posen* is provided with electric lighting, a wireless installation and with a submarine signalling apparatus. She is equipped with a triple-expansion engine of 4,500 i.h.p., which gives her a speed of 12½ knots.

The cargo steamer *Menes*, built to the order of the Kosmos Steamship Co. of Hamburg at the Tecklenborg shipyard, has been put successfully through her trial runs at sea, which were extended as far as Heligoland. Her carrying capacity is 12,200 tons, length 149 m. and beam 18·5 m. The triple-expansion engine developed on the trial 3,900 i.h.p. and the vessel maintained a speed of 14·4 knots. A wireless installation is provided. The Hamburg steamer *Wilhelm Oelsner* has been sold to a shipping firm at Apenrade and was renamed *Elsbeth*. The schoolship *Herzogin Sophie Charlotte* of the North German Lloyd has been sold to a Hamburg firm. This vessel of 2,248 nett register tons was built in 1894 at a Gestemunde shipyard. The Hamburg steamer *Galata* has been sold to a shipping firm in Italy, where she has been re-christened *Apollonia*. The steamer *Hermine* of Hamburg has been sold by her owners to a Danish firm.

Holland.

The Commission on the defence of the Dutch Indies has now published its report. It recommends the creation of a large fleet to consist of nine "Dreadnoughts," each of 21,000 tons, having a speed of 21 knots, six torpedo cruisers, each of 1,200 tons and with a speed of 36 knots, forty-four torpedo boats and twenty-two submarines for the defence of the home coasts. The use of oil fuel is recommended for all these vessels.

The *Konigin Emma* was launched at the shipyard Feyncoord, where she has been built to the order of the Steamship Co., Nederland. Her length is 143·2 m., beam 17·37 m., and carrying capacity 6,200 tons. The vessel will be able to accommodate 260 passengers of first and second class, 34 of third and 140 of steerage. The quadruple-expansion engine of 6,700 i.h.p. will give her a speed of 15½ knots.

Japan.

The Osaka Navigation Co. has decided to establish a fleet of steamers for a service to Europe. For this purpose orders will be placed for seven large steamers each of 10,000 tons. Two steamers of this size are already in course of construction and will open this new service shortly.

Italy.

The Fiat San Giorgio Co. has acquired the Navali Riunite shipyard at Muggiano, near Spezzia, and it is reported that the firm intends to undertake the construction there of large submarines and of vessels for commercial purposes, to be propelled by internal combustion engines.

U.S.A.

The steamer *Congress* has been launched at the shipyard of the New York Shipbuilding Co. at Camden. She is the largest cargo and passenger steamer belonging to the United States, in the coastal traffic, and is destined to ply between Washington and San Diego in California. Her dimensions are: length 134·4 m., beam 16·6 m., depth from main deck 14·7 m, and she will accommodate a crew of 153 men and in addition 416 passengers of first-class, 120 second class and 150 third class. Her engines develop 7,500 i.h.p. and the vessel will have a speed of 16·5 knots. Oil fuel is used for the boilers.

IRON AND STEEL INSTITUTE.—The Brussels meeting of the Institute opens on the 1st of September, and continues until the 4th.

MESSRS. W. H. SPENCER & CO., engineers and boilermakers, of Hitchin, have sent us a copy of their latest publication describing the "Spencer-Hopwood" patent water-tube boilers. The leading features of their boilers are described in a concise manner, and it is a useful catalogue for reference.

THE KING'S SHIPS.

The publication of "The King's Ships," which is dedicated by special permission to His Majesty King George, and written by Lieutenant Halton Stirling Lecky, a naval officer on the active list, is really an event in the history of the Navy. It is stated in the introduction that the author has been engaged on the work for a number of years, and this is readily understood when one surveys the great amount of detail included and appreciates the volume of research amongst records rendered necessary to prepare a work of this kind for the press. "The King's Ships" contains the names of about 7,500 vessels that have fought in the battles of the Royal Navy since the time of the earliest fighting ships; complete chronicles of 4,000 of the vessels are given, including all the names of vessels at present on the active list; the history of the remaining 3,500 is in less detail. Lavishly illustrated by reproductions of old paintings, rare prints, engravings and by photographs, and also a number of coloured plates depicting the dress and equipment of officers, seamen and marines at different periods, the work is to contain 2,500 illustrations, including a number of autographed portraits of distinguished Admirals, figureheads of frigates, and drawings representing the crests or badges of different vessels. In order to obtain these records, the author has had recourse to public manuscripts, private papers, scrap books and albums all over the world; ancient despatches and ships' logs have been carefully studied, and deciphered with difficulty to render clear obscure points, and there is no statement in the whole work that has not been verified. Until the advent of "The King's Ships," no book existed by which the complete history and fortunes of any particular ship and its similarly-named ancestors could be traced; the work, therefore, is unique, and will rank very high in naval literature. Published by Mr. Horace Muirhead, "The King's Ships" will be completed in six volumes, to be issued at short intervals. Volume I., which is now ready, contains 327 pages and a large number of illustrations, including a splendid photogravure frontispiece of His Majesty the King and five full-page illustrations in colour. The volume deals with the letters A and B, and chronicles the history of ships with names commencing with these initial letters. There are three bindings, the cloth being the most inexpensive, and the price of the six volumes is £12 12s., or the volumes may be purchased separately. No efforts and expense have been spared in the preparation of the work, and much praise is due to both author and publisher for introducing to the public a work of such absorbing interest, and which is well worthy of a place in every library.

REVIEWS.

Fighting Ships. Edited by Fred T. Jane. London: Sampson, Low, Marston & Co., Ltd. Price 21/- nett.

THE advent of "Fighting Ships" is always something to look forward to, and even if this, the 16th issue, contains no very special nest-eggs of new information, it is full of fresh figures and illustrations, and the admirable system of official revision by nearly every nation sets the seal of accuracy upon the work. A complete revision has been given to details of the private yards, docking accommodation and the other information that precedes the ship pages with the result that these sections are well worth careful scrutiny. Particulars of new ships in the matter of plans have suffered through official desire for secrecy—that bugbear of the student of things naval. Save for explanatory notes indicating the possible appearance of the ships, the *Warspite*, *Delhi*, *Tiger*, *Konig*, *Derfflinger*, *Fusoo*, and other examples of more or less recent construction are, without illustrations, although fairly full particulars of them are included. A large number of new illustrations have been added, or replaced older ones, including the *Neptune* with the fore funnel raised (and her appearance quite spoiled in consequence) *Warrior*, *Dublin*, *Shark*, *E Submarines*, *Kaiser*, *Seydlitz*, *Wyoming*, *Utah*, *Alabama*, *Kentucky*, *Montana*, *Kongo*, *Aki*, *Satsuma*, *Fuji*, *Tango*, *Azuma*, *Hirato*, *Jean Bart*, *Suffren*, *Bouvet*, *Carnot*, *Libia*, *Ardito*, *Tegetthof*, *Spaun*, *Bayan Rurik*, *Pantelimon*, *Espana*, *Al-Lynch*, *Moreno*, *Messudiveh*, *Altos* and many others. The new plans include the *Rio de Janeiro*, *Al Cochrane*, *Nevelskoy* (new Russian 4,500

cruiser), *Borodino*, *Ekaterina II*, *Andrea Doria*, *Normandia* and *Pennsylvania*, while many others have been corrected and amplified. It is, however, in the text that "Fighting Ships" is so valuable. Year by year the mass of figures grows, and more minute information is included. Thus, the three ships of the *Olfert Fischer* class differ considerably in dimensions and detail, and these are all set forth at length. The Silhouette indices show signs of careful correction and these now are most admirable miniature portraits of the ships, very different from the attempts at Silhouette portrayal that one finds in some of the foreign naval works. We have gone carefully through the lot and can find no instance of even small alterations to rig or funnels having been overlooked. Those pages devoted to the smaller fry—the tenders, training ships and subsidiary vessels, are much fuller than hitherto, while the destroyers and submarine pages are well up-to-date. Especially interesting are those of the latest French boats, the photographs clearly showing the little differences which exist between sister ships. Part II. is devoted to the year's progress in marine engineering and is edited by Chas. de Grave Sells, M.I.C.E., as usual. Some thirty-five pages have condensed into them a mine of information on steam turbines, torsiometers, boilers and expellers, valves, motor ships, airship attack guns, submarines, torpedoes and submarine salvage, to pick out a few sections, and all are illustrated with clear diagrams. As is natural, there are some small errors and these are those of omission more than commission. For instance, the French cruiser *Davout* is omitted entirely, and yet she is still in service, having been reboilered, and now sports three funnels. The Brazil *Javary* is not mentioned, nor is the U.S. training ship *Adams* which was recently in British waters. We should have been glad to know whether she was a mercantile or naval school, so must conclude the former. Might we suggest that a thinner paper be employed. Heavy art material is excellent for reproduction, but makes the book somewhat cumbersome. Could not equally good results be obtained on something lighter?

Scottish Directory and Gazetteer. Edinburgh: Messrs. William MacDonald & Co., Ltd.

THE 1913-1914 edition of this Directory is the 32nd annual edition, and in it several new sections have been embodied. Since the last edition the volume has undergone a complete and thorough revision, in the course of which every city, town and village in Scotland has been visited in order to verify, by personal application the information contained in the volume. The Directory is a most useful publication, well-arranged and produced, and by the adoption of the latest methods Messrs. MacDonald are able to issue it at a very reasonable figure for a volume of such large dimensions, The price to those who order before publication is 12s. 6d., but with the County Supplement (which is an exhaustive directory in itself of the nobility, gentry and private residents, also County Councillors, professional gentlemen and farmers) 20s. The County Directory may be had bound separately at 8s. 6d. A very useful section is the index to cities, towns, etc., by which one can find immediately that part of the Directory dealing with any sought-for city, town or village. The municipal, clerical, medical and gazetteer sections are very useful. A word of praise must also be given to the town plans (of which there are several) and which are all very clear and well produced

The Naval Pocket Book. London: Messrs. W. Thacker and Co. Price 7s. 6d. nett.

THE Naval Pocket Book, which is now in its 18th year, was founded by Sir W. Laird Clowes and is now edited by Mr. R. C. Anderson. The volume aims at giving particulars of the units of the world's navies and is carried out in alphabetical arrangement; this part of the book occupies over 400 pages. Another important section of the publication is that giving plans of the more important types of vessels of the British and foreign fleets. For quick reference an index to the names of ships mentioned is included. This, however, does not complete the information given in the volume, which further includes a list of the dry docks throughout the world, particulars of the various makes of naval guns and much other useful and accurate information. In a book of such small dimensions one does not look for such a mass of detailed information as this volume contains, all of which is well arranged and of great value to those interested in the navies of the world.

OBITUARY.

Mr. Thomas Walton. It is with regret that we have to announce the death of Mr. Thomas Walton, the well-known author of "Know your own ship," who died suddenly on August 4th. Mr. Walton had many friends in shipping circles, and was very popular among nautical men. He was only 45 years of age at the time of his death. "Steel Ships" was also one of his books.

Mr. John Blumer. We also regret to have to record the death of Mr. John Blumer, founder of the firm of Messrs. John Blumer & Co., of Sunderland, which took place on August 20th at the age of 81. He retired from active business in 1895, and left his three sons in charge of the business.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our own Correspondent.*)

After the Holidays.—Although officially ending on Monday and Tuesday, 28th and 29th July, the Glasgow "Fair Holidays," as per custom, were tapered into the remaining days of the week and it was really not until the Monday following that anything like a full resumption of operations took place. Peace having been arrived at in regard to wages questions before the stoppage, everything contributed to a vigorous start and steady pursuit of industry. The following were the terms of the agreement come to: "It is mutually agreed that an advance of wages of 1s. per week, or ½d. per hour where payment is made by the hour, to time workers, and a special advance of 2½ per cent. to riveters employed on piece work, for behoof of holders-on, shall take effect on and from the commencement of the first full pay in August, 1913; no further general alteration in wages, piece or time, to take effect for a period of twelve months from the date named." The Executive Council of the Boilermakers' Society also recommended their branches that the working of overtime—which was stopped in the course of the agitation over the general wages question—should be resumed immediately. This, in many cases where employers have required overtime work, has been respected.

With the situation as to labour thus satisfactory it had been hoped that a revival in the placing of new contracts would set in, but so far this anticipation has not been realized, at least as regards mercantile tonnage, and very few fresh orders have been secured since the resumption. What these consist of will appear in the course of these notes.

New Naval Work.—Naval contracting firms on the Clyde, equally with these on the Tyne and other centres, awaited with keen interest the allocation of the new naval shipbuilding and engineering work, for which tenders had been sent in to the Admiralty in July. The amount of work involved was unusually large and its distribution a question of some uncertainty. Provisional contracts were placed for the bulk of the work on 15th and 16th August, and the Clyde has shared not inconsiderably in the allocation, although the Tyne has secured the lion's share on this occasion. The full tale of work to be given out at this time included three contract battleships; propelling machinery for two dockyard battleships; five contract light cruisers; sixteen destroyers and two tug-boats, but of this list a proportion still remains at the time of writing to be definitely placed. One of the battleships is to be built and engined by Messrs. William Beardmore & Co., Dalmuir, the other two going to the Tyne and Barrow respectively. The orders for the propelling machinery for the two battleships which are to be built in the Royal Dockyards have been secured by Tyne firms. Of the five light cruisers orders for three of these have been placed, two with Tyne firms and the third with a Birkenhead firm. It is thought that the remaining two light cruisers, originally intended for contractors, may be built at the Royal Dockyards. Of the sixteen torpedo boat destroyers provided for in the Estimates for the current year thirteen have been ordered; six from Clyde firms and the others from Tyne and South of England firms. Of the six vessels going to the Clyde three will be built and engined by Messrs. John Brown & Co., Ltd., Clydebank, and three by Messrs. Yarrow & Co., Scotstoun.

Messrs. Yarrow & Co., Scotstoun, who, as above indicated, have shared in the present distribution of naval contract work to the extent of three torpedo-boat destroyers, launched from the stocks on August 16th, the destroyer *Havock* for the British Admiralty. She is of 935 tons displacement, 24,000 i.h.p. and is designed for 32 knots speed, with engines and boilers supplied by the builders. They have on the stocks three other destroyers for the Admiralty—the *Haughty*, the *Hereward*, and the *Hotspur*—besides other small war craft for Japan and other countries.

Speed Trials of New Vessels.—Speed trials more than launches of new vessels have been the form of Clydeside activity during August, and some of the subjects of trial have, as usual, been productions of other centres than the Clyde sent to run over the Clyde "measured mile," which has more and more become the standard arena for speed trials. Torpedo destroyers have been more in evidence than merchant vessels, as the tests are more elaborate in their case. H.M.S. scout cruiser *Fearless* launched at Pembroke Dockyard in June last year and engined by Messrs. William Beardmore & Co., Dalmuir, has been in Clyde waters and undergone various trials of thirty hours' and twelve hours' duration, including an eight hours' continuous steaming test at 30 knots. Another destroyer put through a series of full and varying speed trials was the *Lynx*, one of the three similar vessels built by the London and Glasgow Shipbuilding Company (now Harland & Wolff), Govan. Among merchant vessels successfully put through their paces were the *India*, 5,700 tons, built by Messrs. Charles Connell & Co., Scotstoun, for the Indra Lines, Liverpool; the *Ceylon*, 5,048 tons, built by Messrs. A. McMillan & Son, Dumbarton, and engined by Messrs. David Rowan & Co., Glasgow, for the Stoomvaart Maatschappij Rotterdamsche Lloyd; the *Bucegi*, built by the Greenock and Grangemouth Dockyard Co., Greenock, for the Roumanian State Railways Service; and the *Toyoia Maru*, built by Messrs. Napier and Miller, Old Kilpatrick, for Japanese owners. Speed and dredging trials were also carried out with a bucket ladder dredger built by Messrs. William Simons & Co., Renfrew, for Russian owners.

Messrs. William Denny & Bros., Dumbarton, have completed the first of two crane lighters built to Admiralty orders for service in the neighbourhood of the Royal Dockyards, and it left the builders' basin on August 6th under tow for Chatham. The second of these highly special craft is now approaching completion and will leave shortly for the South of England. Messrs. Denny's large establishment is, as usual, well occupied with important contracts for mercantile and naval ships, and they will shortly launch their 1,000th vessel.

Messrs. The Clyde Shipbuilding and Engineering Company, Ltd., Port Glasgow, who, on 7th August, launched a screw steamer 310 ft. in length named *Carlo* for Messrs. Thos. Wilson, Sons & Co., Ltd., Hull—a feature of which is the "cruiser" form of stern now coming into favour even for cargo-carrying vessels—have recently received contracts for the building and engining of two steamers for the Royal Adria Steamship Company, Trieste. The firm have already built several vessels for this Company, but the new vessels will be 15 ft. longer than any yet constructed.

Messrs. Ferguson Brothers, Port Glasgow, have received an order to construct a bucket ladder dredger, also a hopper barge for Australian owners.

Messrs. The Greenock and Grangemouth Dockyard Co. have recently contracted to build for the Argentine Government an oil-tank steamer of 2,000 tons capacity to be used for the conveyance of oil-fuel from the Argentine oil-fields to their fleet and for other purposes. This vessel will be laid down at the Company's Grangemouth yard, and will be constructed on the Isherwood longitudinal frame system. She will carry 2,600 tons of oil and the boiler furnaces will be arranged to burn either coal or oil fuel. Messrs. Cooper and Greig, of Dundee, will construct the propelling machinery.

Messrs. Hugh McLean & Son, boat-builders, Govan, who had recently to vacate their premises at Water Row, the site having been acquired by Messrs. Harland & Wolff, are now completely established in new premises in Ure Street, Govan. The equipment with power and every requisite facility for rapid and accurate work is thoroughly up-to-date and the volume of work on hand is so great as to tax the productive capacity of the establishment to the utmost. Indeed, the firm have had to sub-contract for the building of a proportion of the orders on hand by other firms in Glasgow, Renfrew and Port Glasgow. The scarcity of workmen, even with the very high wages offered, is at present a strong drawback. All the contracts on hand are for lifeboats of the semi-collapsible type—rigid and decked over bottom part, with collapsible sides—an improved design of which has recently been patented by the firm, and examples tested and passed by the officials of the Board of Trade.

Messrs. Mackie & Thomson, Ltd., whose shipyard at Govan will be absorbed in the works of Messrs. Harland and Wolff, Govan, when the work on the stocks is completed, have been pressing on with their new yard at Irvine, and on August 13th they laid the keel of the first vessel to be undertaken there. That the firm intend to occupy themselves, in their new and more capable premises, with vessels of larger tonnage than the coasting and trawling types of vessels which formed the staple product at Govan, is indicated by the fact that the vessel whose keel has now been laid is a twin-screw cargo-carrying steamer of 365 ft. length, and that the keels of two vessels of over 400 ft. will shortly be laid on other two building berths which are nearly in a completed state.

Messrs. D. M. Cumming & Co., Blackhill Dock, Glasgow, have received a contract from foreign owners to build two barges, each of 60 tons.

Messrs. The Electric Marine Propulsion Company, Limited, Glasgow, have nearly completed the installation of electric propulsion machinery on board the electric ship *Tynemouth*, which was launched in March by Messrs. Smiths' Docks Company, of the Tyne, for service on the Canadian Lakes, and a series of speed and other trials will shortly take place. This vessel and her notable propulsive equipment of electrical generating and transmission machinery, actuated by Diesel Oil engines, were matters very fully described in a paper read at the recent Summer Meetings of the Institution of Naval Architects by Messrs. John Reid and Henry A. Mavor—the former being responsible for the design of the ship, and the latter of the electrical machinery—and the paper was reproduced *in extenso*, with illustrations, in the July issue of *The Marine Engineer and Naval Architect*.

Messrs. Babcock & Wilcox, Ltd., of Renfrew and London, have had their tenders provisionally accepted by the Port of London Authority for the supply of fifty-five electric cranes, forty-three of which are intended for the improved crane equipment of the Albert Docks and twelve for the docks at Tilbury. The total amount of tender for the fifty-five cranes was £101,660. All the cranes will be fitted with the makers' patent luffing gear, and have a radius of 60 ft., and a lifting capacity of 30 cwt. at ordinary speed, while there will be gear to admit of lifting three tons at a slower speed. The cranes will represent an advance, both as regards their increased power and greater radius, over those which they are designed to supersede.

East of Scotland Shipyards of the smaller order, as distinguished from the larger yards situated on the Forth, Tay and Dee, have alone contributed to the output for August, the amount, however, being small. The items were, as usual, of the fishing order, mostly steam drifters. Messrs. A. Hall and Co., Aberdeen, launched a drifter of 86 ft. length for local owners. Messrs. Scott Yule, of Fraserburgh, launched an 88 ft. drifter which they have built for a syndicate of local fishermen, the engines for which will be supplied by Messrs. John Lewes & Son, Aberdeen.

Kelvin, Bottomley & Baird, Limited, is the altered style of the Company which, as "Kelvin James White, Limited," Cambridge Street, Glasgow, and especially as associated with the late Lord Kelvin and his various scientific inventions concerned with navigation and electricity, has so long enjoyed world-wide celebrity. The alteration has been made chiefly with the object of avoiding the confusion which has frequently arisen between the old name and that of another firm of Glasgow nautical instrument makers with which the Kelvin Company has no connection, but also in order to render the name more distinctive through including reference to two directors whose share in the Company's reputation for many years past has not been inconsiderable. The name of Bottomley has for over thirty years been connected with the business. Dr. J. T. Bottomley, LL.D., F.R.S., who is at present chairman of the Company, is a nephew of the late Lord Kelvin, and for many years was closely associated with the renowned scientist, and assisted him in his work. Mr. Alfred W. Baird, whose name also now appears in the style

of the Company, has for a number of years been a director of the Company, while for a much longer period he has, as the outside representative of the Kelvin Company in respect of compass-adjustment and other highly responsible matters, been a familiar and universally respected personality in shipbuilding and sea-faring circles throughout Britain. Mr. Baird entered Lord Kelvin's service twenty-nine years ago, and under the personal supervision of the renowned scientist he studied the problems connected with the compass on shipboard, the causes of its deviation, etc. As is now well-known Mr. Baird's experience and knowledge in these directions are unequalled. He has personally trained a staff of competent adjusters, by whom he is now ably assisted in all the work of testing and installing compasses, sounding machines, and other items of navigational equipment.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

THE s.s. *Harry Wadsworth, ex Henri Rieth*, oil tanker, of 2,265 tons, has been sold by Messrs. J. M. Lennard and Sons to Messrs. Houlder, Middleton & Co., London (Quinque, Ltd.).

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are reported as likely to secure the contract to build a steamer for Liverpool owners that is in the market.

Messrs. W. Harkess & Sons, Ltd.—Nothing new is reported, but they are well supplied with both old and new work sufficient to keep them well occupied into next year.

Messrs. Smith's Dock Co., South Bank, have a large number of steamers repairing, docking and building, and are reported as having secured the contract to build two medium-sized trawlers.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy on both land and marine work, and are reported to have secured the contract to build several large boilers for a twin screw steamer for colonial owners. They are also very busy in their speciality department.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. have a large amount of work on hand. They are reported as likely to secure the contract to build a cargo steamer that is in the market.

Messrs. Craig, Taylor & Co. have a sufficient amount of work on hand to keep them busy for a long time to come.

Messrs. R. Ropner & Sons are reported to have secured the contract to build a steamer for local owners, which, with the work on hand, will keep them busy well into next year.

Messrs. Blair & Co. have a large amount of work on hand, principally for steamers building on the Tees. They are reported as having secured the contract to supply the engines and boilers for a cargo steamer that is to be built locally.

West Hartlepool.

Messrs. Furness, Withy & Co., Ltd., have sold the s.s. *Avata*, 3,755 gross tons, to Italian shipowners for about £15,000. They are asking tenders for a floating dock for Rotterdam, to be used in connection with the repairing establishment now being constructed for their subsidiary Company.

Messrs. R. Livingston & Co. have sold the s.s. *Glenwood*, 1,972 gross tons, 3,000 tons deadweight, to German owners through Messrs. Blanc & Wright, Ltd., for about £11,000.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are full up with both old and new work. They have secured the contract to build two cargo steamers of about 3,500 tons deadweight, one for early delivery and one next year.

Messrs. W. Gray & Co. have a large amount of work on hand at both the old and new yards, which will keep them busy for at least twelve months. They have also a large amount of repair work on hand.

The Central Marine Engine Works of Messrs. W. Gray and Co., Ltd., continue to be very busy in all departments. They are supplying the engines and boilers for all the steamers building by them. The works manager, Mr. Henderson, has retired after a service of about twenty-six years, and was the recipient of a handsome presentation of a purse of gold. It is reported he will be succeeded by Mr. M. Warren, assistant works manager.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, have a very large amount of work on hand. They have secured the contract to build two steamers, sister ships to those recently built for the Transport Line (Messrs. Houlder Bros.), to be delivered next year. They are reported as being built to the order of Messrs. Furness, Withy & Co., West Hartlepool and London.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be busy in all departments except the forge. They have a very large amount of work on hand, and are reported as having secured the contract to supply the engines and boilers for the four steamers to be built by the Irvine Shipbuilding and Dry Dock Co. at both their yards, they are also very busy on condensing plants, all on the Contraflo system, which is giving such excellent results.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Extension of Grimsby Fish Dock.—Sir Alexander Henderson, Bart., Chairman of the Great Central Railway Co., and Sir Sam Fay, General Manager, met a deputation of Grimsby Fishing Vessel Owners, comprising Councillor R. W. Roberts, J.P., Mr. W. S. Letten, and Mr. G. S. Letten, with regard to the progress of the New Grimsby Fish Dock scheme. It was stated that the lack of accommodation on the Fish Dock was never more keenly felt than at the present time. The extra trawlers from Blyth had made it worse than ever, and it was mentioned that there was urgent need to push the matter forward at once. The deputation was assured that the Railway Company were hurrying forward the work as quickly as possible. The plans and details of the proposed new dock were discussed at some length, and several suggestions made. It was made evident that the Company wished to meet the demands of the fish trade as far as possible, and it was understood that before the scheme commenced, the plans would be submitted to the trade for full consideration.

Grimsby Officers Demand More Pay.—The application of the captains and officers of the Great Central Railway Company's Steamship service with the Continent, for an increase in wages, and the Company to victual them during absence from Grimsby, terminated satisfactorily for the officers and masters, the negotiations being ably conducted by Capt. Walker of the Imperial Merchant Service Guild. There was no stoppage of sailings.

Grimsby and Immingham Docks.—Strike trouble at the Great Central Docks at Grimsby and Immingham has been happily averted, by certain grants being accorded to the workmen.

Admiral of the Humber.—The Mayor of Hull, Alderman John Brown, J.P., by virtue of his Office, is Admiral of the river Humber. On the 13th August he chartered the Great Central Railway Company's Steamer *Cleethorpes*, on which he hoisted his flag and embarked about two hundred friends. They steamed down the river to Spurn Point, but unfortunately could not land owing to the state of tide, etc. During the run homewards a splendid lunch was provided, a stop was made at Immingham and the vessel steamed through the new Docks, and headed for Hull, after a very enjoyable outing; Mr. Foster's string band supplied the music and the party felt greatly indebted to the Mayor for his kindness.

Naval Oil Fuel Depot.—It is understood that a large firm of Engineers are asking for estimates for the laying of pipes from Grimsby (Immingham) to Selby, for conveying oil, it is believed for Naval purposes, from huge supply tanks, which are proposed to be erected at Selby. It is surmised that the Town has been selected on account of its security from attack by shelling, and its proximity to the proposed new Naval base on the river Humber. It is stated in addition, Messrs. Armstrong, Whitworth & Co. intend to proceed immediately with the erection of large plant for the construction of Aeroplanes, Hydroplanes, and large Air-ships. The firm expect to have some three hundred workmen employed within the next two months.

Trade of the Port of Hull.—The trade of the Port in shipping seems very brisk at the moment, there are many

steamers in the various docks discharging grain and seed from India and South America. The coal trade is good and the Baltic timber trade brisk. There is a great fleet of steamers at the present time on the way from India and South America and the Far East with grain cargoes for Hull. The work on the new docks is being pushed along with all speed, and water will soon be let in. The Hull Corporation have the trams running to Marfleet where the main gates of the new docks will be erected. The North Eastern Railway Company are now having miles of new sidings prepared, and the Hull and Barnsley Railway Company likewise.

Messrs. Earles' Shipbuilding Co., Ltd., are fairly busy with new steamers building for different firms. They have booked a steamer to build for the Wilson Line (s.s. *Tinto Class*) for the Norway trade, cargo only, to run between London and Christiania. She will be built to the British Corporation and Lloyd's requirements and will be fully equipped with the latest machinery for propelling, and discharging appliances. She will be built under the supervision of Mr. W. S. Hide, the Company's supt. engineer. The patent slips of the firm seem to be fairly well employed with steamers undergoing repairs and being put through Lloyd's survey, etc.

Messrs. Amos & Smith, engineers and boilermakers and ship repairers, are fairly busy with boilers and machinery for trawlers, and have booked several sets of machinery for trawlers from different owners. The branch shop at Alexandra Dock is busy with repair and graving dock work, and has good prospects for September. The outside staff of Albert Dock works are kept busy with repairs on the different Town Docks, opening out boilers and machinery for survey, and are also fitting boilers and engines on trawlers at Queen's Dock, preparing for trial trips.

Messrs. Cooper & Co., Ltd., Neptune Engine Works, have been exceedingly busy during the month with graving dock work, and heavy repairs on the trawler *Mercury*, cut out two old furnaces and renewed same. R.M.S.P. *Denbighshire*, new funnel fitted, also one furnace cut out and renewed and several other repairs. Several local steamers have been overhauled and opened out for survey, etc. The firm's branch shop at Alexandra Dock has been fairly well employed in repairs and graving dock work. The Company's own graving dock is busy and the s.s. *Ouse* is in, having fifteen plates renewed, also floors, intercostals and girders. The dock is well booked ahead for September and prospects are good.

Messrs. Stewart & Craig, engineers and ship repairers, have had a fairly good month of repair work, on all classes of steamers, and have numerous enquiries for September.

Messrs. Woodall & Co., engineers, have been very busy. The steamers which have had repair work done on them are as follows:—s.s. *Gletra*, s.s. *L. H. Carl*, s.s. *St. Petersburg*, s.s. *Carlo*, s.s. *Ierne*, s.s. *England*, s.s. *Rolf*. Many orders for forgings for small shipyards and L. C. Council and Hull Corporation have been received.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have been exceedingly busy during the month on repair work on several steamers in the several docks. Several good enquiries for heavy repairs and graving dock work have been received which promises a busy September. The R.M.S.P. *Parana* has had insulation renewed in several holds, and general repairs in engine room and on deck executed, also the s.s. *Therapia*, s.s. *Owain Tudur*, and repairs on s.s. *Corinth*.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are still booking orders, which cannot in any case be executed well into next year; this firm is working at high pressure having so many trawlers and coasters to build for local owners and France. Several trawlers are now fitting out at Queen's Dock, Hull, with machinery, etc. and preparing for trial trips.

Mr. Scarr, shipbuilder, Hessle, is fairly busy at present, building a tug boat for local owners, also several lighters; prospects seem good.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—This firm are now laying the keel for a new coastguard cruiser for the Government, which is to be named the *Safeguard*. The new iron foundry is nearing completion, and the big electric cranes are now working. This department is kept very busy, and a large amount of castings has been turned out lately. Last month the slipway machinery for the Crown Agents for the Colonies was erected in the shops, and the cradles were nearing completion. A good deal of new work has been booked during the past month. The firm have just received word from their engineer at Bilboa reporting the satisfactory trials in connection with the machinery for the 130-ton floating sheers recently completed by the firm. The following are particulars of this set of sheers. The front legs are each 100 ft. long, back leg 134 ft. long, lifting power 130 tons at 36 ft. 6 in. outreach, and fifty tons at 53 ft. outreach, and the block can be lowered 65 ft. below the water line. The screw was 60 ft. long, and weighed eight tons. It was one of the largest ever made at the works. The pontoon was built by the Euskalduna Company at Bilboa, who also constructed the legs from the firm's designs. All the machinery and boiler were built at the firm's works here, and shipped out for erection under the firm's engineer's superintendence.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Several torpedo boat destroyers are fitting out and on the stocks at the above firm's yard. The *Paragon* and *Porpoise* are almost ready for service, and two other vessels are nearing completion. The placing of the new Admiralty orders is eagerly awaited locally, and it is confidently anticipated that the firm will participate to a considerable extent in the new work, as they are in an exceptionally good position to give quick delivery for this class of work. Should these anticipations be fulfilled the firm are assured of a continuance of the very busy time they have enjoyed for some considerable time past.

The American Line steamer *St. Louis* left Southampton last month after being out of commission since the end of last year. She was here undergoing an extensive overhaul to her machinery when the engineers' strike occurred. This delayed her sailing, and she was eventually sent over to Antwerp for the completion of her overhaul.

THAMES.

(*From our Own Correspondent.*)

London Shipping.—From particulars furnished by the Port of London Authority relating to the shipping returns of the port for the three months ending 30th June, we are enabled to see that there has been a very satisfactory recovery in the trade after the labour disturbances of the spring of last year, with which these are compared. The returns show not only that the leeway of last year has been made up, but that there has been a substantial growth in comparison with the same period of 1911, which was a normal period. There has been an advance under every heading, and the shipping entering and leaving the port and paying tonnage dues shows an increase of just under 400,000 tons.

Shipping Company.—Following on the recent report of Messrs. Furness, Withy & Co., there is a notification that the firm has placed orders for seven steamers, four of which are to be built by Messrs. Irvine's Shipbuilding & Dry Dock Co., of West Hartlepool, two by Messrs. Osbourne, Graham & Co., of Sunderland, and one by the Londonderry Shipbuilding Co. The seven sets of engines are to be built by Messrs. Richardsons, Westgarth & Co., engineers, Hartlepool. Messrs. C. T. Bowring & Co., Ltd., had recently launched for them from the Tyne Iron Shipbuilding Co.'s yard the s.s. *Silvia*, which is of the following dimensions: 367 ft. long, 51 ft. broad and a depth of 32 ft. 4 ins. The vessel is designed for carrying petroleum in bulk. Fitted with a complete oil pumping installation, including oil pumps of large size for working against heavy back pressure, and steel heating coils in each tank for creosote and heavy oils, also gas freeing pipes, the vessel is replete in every way. The engines are by the North Eastern Marine Engineering Co., Ltd.

The Thames and The Australian Trade.—Amongst the large number of vessels just built or building for this trade, we note the *Euripides* for the Aberdeen line, an improved *Orama* of 14,000 tons for the Orient line, a 13,000-ton vessel for the Federal Shire line, three new P. & O. steamers branch liners, named the *Borda*, the *Berrinia* and the *Bendigo*, and three Federal and Shire liners of 8,000 tons each. The above

are only a few of the vessels building for this trade at the present time.

New Cunard Liner in Thames Docks.—The *Andania* of this line recently arrived in the Commercial Docks and is by far the largest vessel, 13,400 tons to come so far up the river. When entering the dock she drew 23 ft. forward and 25½ ft. aft, her length being only 10 ft. less than the Greenland Dock, the depth of water in which was 33 ft. This vessel and her sister, the *Alaunia* will continue to make regular voyages from Canada to the Commercial Dock. The cargo is dairy produce and no fewer than 550 passengers came to London in the vessel, of which the dimensions are given as 540 ft. by 64 ft. by 46 ft.

New Dock Machinery.—The Port of London Authority has placed an order for three pairs of lock gates with a German engineering firm for an electrically operated bascule bridge and a floating caisson and swing bridge, all for the Royal Albert Dock extension. The total value of this work is given as £200,000. This follows on a smaller contract placed in the same quarter a short time ago.

The Worcester Training Ship.—The annual prize distribution on this ship took place recently, with Sir Thos. Sutherland as the president, and among the company present were the Marquis of Graham, Lord Brassey, Admiral Freemantle, and Mr. Devitt. The report was in every way a satisfactory one.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

GREAT activity prevails in completing and fitting-out vessels in hand, whilst additional Admiralty work has also been secured locally.

Messrs Cammell, Laird & Co.—H.M.S. *Audacious* returned to the Mersey on Aug. 7th, having very successfully completed her exhaustive trials with Plymouth as a base. It is understood that this is the first vessel constructed by private contractors to complete her trials manned exclusively by men supplied by the contractors. The machinery worked right through without a hitch, and all the requirements were exceeded. Gunnery and torpedo trials were carried out off the Isle of Wight by a gunnery crew of H.M.S. *Excellent*. While anchored in Plymouth Sound about midnight on July 25th, a fireman fell overboard from a tug alongside. Mr. Leslie Mann, of Waterloo, acting as second officer, at once jumped overboard and held his man up until both were pulled on board the tug. On behalf of the builders, Mr. G. J. Carter presented Mr. Mann with a valuable stop watch in recognition of his bravery. H.M.S. *Garland*, torpedo-boat destroyer, is fast nearing completion, and will shortly run her trials. The first of four steamers building for the P. & O. Company is expected to be launched early in September, and will be named the *Khiva*. The names of the other three will be *Khyber*, *Kandahar* and *Khorassan*. The Canadian train ferry is making good progress, as are other vessels on order at present. Great satisfaction has been felt locally by the placing of an order for the hull and machinery of a light cruiser for the British Admiralty with Messrs. Cammell, Laird & Co. Similar orders have also been placed with Messrs. Swan, Hunter & Co., and Messrs. Hawthorn, Leslie. Mr. G. J. Carter, managing director of Messrs. Cammell, Laird's Birkenhead works, has been elected one of the vice-presidents of the Employers' Federation. A good deal of repair work is in hand, amongst other vessels being the *Indus* of the Nourse Line, the Rankin Gilmour steamer *St. Nicholas*, and others. Amongst the work in hand on the Liverpool side may be mentioned the fitting of 4·7 guns to the Royal Mail steamer *Desna*.

Messrs. H. & C. Grayson.—This firm have been kept busy in all departments. The steamer *Teakwood* has been altered to carry molasses, besides general repairs. The steamer *Rudolf* has had damage repairs, including propeller shaft. Heavy repairs have also been carried out to the *Dunedin*, and also to the Clan Liner *Clan M'Ewan*. At Garston, Messrs. Grayson have the Amazon steamer *Goyaz* still in hand, while on the stocks a lightship for Trinity House and other craft for coasting and river work are in hand.

Liverpool Landing Stage.—A new bridge has just been completed for passenger traffic, the cost of which is £8,000, the contractors being Messrs. Francis Morton & Co. This stage is considered to be the largest and most used in existence, and at times its capacity is taxed to the utmost.

The "Titanic" Engine-Room Heroes Memorial.—At the site of this memorial, which is situated at the Prince's Parade, overlooking the Prince's and George's landing stage, a sign-board has been erected. Upon this board is the notice:—"Site of the Memorial to the Engine-Room Heroes, who, 'Faithful unto Death,' died when keeping their last 'Stand By.'"

Liverpool Shipping Federation. The death took place recently of Major J. G. McCann, secretary of the Shipping Federation, and a recognised authority on all matters relating to Liverpool shipping. Major McCann, who was seventy-four years of age, obtained the V.D. in the volunteer movement and was latterly attached to the 6th Liverpool Regiment.

The Canadian Northern Railway Co.—The *Royal George*, which was recently in Messrs. Cammell Lairds hands for heavy bottom damage, reached Avonmouth on August 2nd, having made a record passage between Montreal and Avonmouth, the time taken on voyage being five days, seventeen hours, four minutes, while from land to land the time was three days, nineteen hours, twenty-five minutes.

British Order placed Abroad.—The Antwerp Engineering Company of Hoboken, Antwerp, have recently completed a 7,600 tons cargo steamer, named the *Glenrazan*, for Messrs. Henry Fernie & Co., of Liverpool. The builders, under the able managership of Mr. David Petrie, have become amongst the best known on the Continent. Other British orders have recently been placed in Dunkirk, France.

Blue Funnel Line.—This Company's new steamer *Ascanius* sailed upon her maiden voyage from Liverpool to Australia *via* Cape Town, on August 11th.

Irish Traffic at Holyhead.—A great increase has recently taken place in the passenger traffic at this port, probably partly due to the very fine weather. No fewer than three steamers were despatched for Dublin on the morning of Saturday, August 9th.

Cunard Line and Queenstown.—This Company have decided that after Saturday, August 23rd, the large steamers will cease to call at this port for mails. The Postmaster-General has requested the Cunard to arrange for their steamers to leave Liverpool later, but this the Company find they cannot agree to do. This will apply to the *Lusitania*, *Mauretania* and *Aquitania*. The smaller vessels may continue to call.

The Manchester Ship Canal.— he year 1913 promises to be the most prosperous in the Canal history. The returns for the first seven months indicate an increase in revenue of £37,766. A private company has acquired land for works which will manufacture filtering material for sewage works, etc., from the slag which will be obtained from the Partington Steel and Iron Works.

The "Great Eastern."— Capt. Walter Godsall who acted as navigating officer on the Great Eastern, died at Whitstable, on July 24th. Amongst the incidents in the Captain's career may be mentioned his presence at the bombardment of Alexandria.

Bidston Lighthouse.—This historic landmark is to be used no more for active service. The channels now mostly used by vessels coming into Liverpool are the Queen's and Crosby, which channels are very efficiently lighted and buoyed. This light, which was established in 1771, had a Semaphore erected in 1823, while in 1873 it was rebuilt and a telegraph station added. This light along with Leasowe and Hoylake, was used by vessels making the Rock Channel, the latter channel having now become disused. Bidston Lighthouse will hereafter be used as an observatory.

Training-Ship "Conway."—The annual prize distribution took place on July 30th, when Admiral Sir Wilmot H. Fawkes, G.C.B., K.C.V.O., R.N., was the honoured guest. After the distribution the Admiral addressed the boys. The average number of cadets for the year has been one hundred and eighty-eight. Sixteen candidates for Naval Cadetships at the Royal Naval College, Dartmouth, were sent up, out of whom thirteen were accepted. There are now twenty-four cadets at Dartmouth. This famous training ship took an important part in the recent Naval pageant during the King's visit.

Towing an Iceberg.—The Cable Ship *Mackay Bennett* has recently returned to Halifax from Newfoundland, whither it had been despatched to repair a cable. It was found that an iceberg had drifted ashore and had cut the cable. A

hawser having been passed round the berg the huge mass was towed out to sea until a southerly current was encountered, which carried the berg away. A towing speed of 300 ft. per hour only was obtained.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The chief event of the month has been the receipt from the Admiralty of the order to build another super-"Dreadnought" for the British Navy. It was quite expected that the Vickers' Co. and the Beardmore Co. would secure two of the three "Dreadnoughts" which the Admiralty had to give out, as the latter firm has delivered her last "Dreadnought" and Vickers Limited will soon be ready to launch the *Delhi*. The new order booked at Barrow will enable the yard to maintain its ordinary run of activity, as the new vessel will in all probability go down on the same stocks as will shortly be vacated by the launch of the Turkish battleship *Reshad V*. The new battleship is to be delivered to the Admiralty in two years, providing there are no strikes or other causes of delay to interfere with the progress of the work. But it is clear that the big orders held by the Vickers' firm, and the new addition to the list just made will mean the employment of a largely increased number of men.

Airships.—It is difficult to get information as to what is being done in reference to the establishment of works at Barrow for the building of airships, aeroplanes, hydroplanes and all other classes of air-craft. Vickers Limited are, however, entering into this business on a large scale. Several acres of land have been acquired on Walney Island for the erection of aviation works, and quite a large number of men are already employed in road making and other work incidental to the building of the several departments of work. It is known, however, that the firm intend to build airships of various types, large and small, and all classes of air craft, and that they have received an order from the Admiralty to build five Parseval airships, the right to do which they have purchased from the German owners. It is expected the new airship works will be ready to commence work in the course of a year at the most, and in the meantime the firm are as busy as they can be in completing their arrangements. It is known, of course, that the Admiralty has determined to make headway in the aviation business, now that they have adopted the various types of machines they will require, and this is likely to result in much business coming to firms like Vickers Limited.

The Japanese Battle Cruiser "Kongo."—This fine warship, built at Barrow, has been completed, and left Barrow early in the month for Belfast to be dry-docked before proceeding to Plymouth, and then direct to the Far East. The Japanese officers and men are very pleased with this up-to-date vessel, and her many advantages for warfare. She had the misfortune in Belfast Lough to lose one of her torpedoes, and a big reward was offered to any who might find and restore it. Search has been made for the missing torpedo, but up to the present it has not been found. This loss will not delay the vessel's departure from England, as the torpedo is the property of the builders.

Reshad V.—Preparations are in progress for the launching of this battleship from the yard of Vickers Limited early in September. There have been many rumours about this ship being likely to come into the possession of Britain, but there seems to be no truth in them. Turkey feels the necessity of being protected by modern and up-to-date warships, and there is the intention of securing at any rate the delivery of *Reshad V.* in the summer of next year. She is quite a good ship, in which all the advances of fighting power have been utilised, and when she lands in the Mediterranean she will be as perfect and as complete a fighting machine as any of the vessels now riding the waters of that inland sea.

Submarines.—Quite a busy time is to be seen in the submarine constructing department of Vickers' works. All the work in hand is for the British Navy, and as successive vessels are built they are found to embrace further steps in the direction of progress, both in the matter of size and general equipment. The newest design is indeed regarded as a bold advance in the matter of size, speed and general fitments. The submarine has been found to be of greater and greater utility for service during war, and the Admiralty are determined to possess quite a powerful fleet of these very interesting subaqueous vessels.

Other Work.—Vickers Limited are busy with a large variety of other orders, including two light cruisers for Britain, a large oil tank steamer for the Admiralty, a floating dock for the Argentine Government, an addition to the big floating dock built some time ago for the Brazilian Government, and other small craft. In the engineering works, the engines to propel the new battleship *Queen Elizabeth* are fast reaching completion. The gun-mounting department is very busy.

Steel.—There is still a big demand for all classes of shipbuilding steel and prices are a little easier.

Hæmatities.—The demand for hæmatite iron has fallen off to a considerable extent and prices are down at 67/6 cash.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff and Barry.

NOTWITHSTANDING the fact that the ship-repairing industry of the Bristol Channel usually experiences a slack time after a Bank holiday, and also that the present month is generally a dull time for that particular trade, there were indications of activity manifested in the principal repairing establishments of this port throughout the month. It has been generally remarked that the usual period of inactivity experienced after a Bank holiday has been conspicuous by its absence during the present year, business having recovered sharply on the expiration of the three principal holiday periods. And although no repairs calling for any special comment have been in hand, yet the volume of general repairs and ordinary dry-dock work has been large, and the result of the month's work must be gratifying alike to the employers and the workmen. Considering the vast resources available for repair work at Bristol Channel ports, it is perhaps not surprising that such a large share of the business finds its way to this district, and as rapid despatch is one of the inherent qualities of the firms catering for the work the resulting economy to the shipowners who wisely elect to send their ships here must be gratifying.

Mountstuart Dry Docks, Ltd.—Following on the usual brisk state of affairs prevalent in the docks of this Company there has been a rapid succession of steamers in the docks and at the jetties, totalling about 90,000 tons for the month. The repairs have not been of a distinctive nature, but mainly general overhauls. At the time of writing the docks are full, amongst the vessels being the large oil-tanker *Goldmouth*, which is undergoing an extensive overhaul.

The Channel Dry Dock and Pontoon Co. have dealt with a large number of steamers for ordinary docking and general repairs at their various establishments, and are well employed at the time of writing.

Hill's Dry Dock Co. continues to enjoy a fair share of the work of the port, and seems to secure the bulk of the repairs to the oversea grain-laden sailing ships frequenting the docks.

At Barry the same activity has been noticeable during the month, and while the heavy repairs so common here during the winter and spring have latterly been few, yet the general volume of work leaves very little to be desired, considering the season of the year.

The Graving Dock Co. have rarely been without a ship at their premises, and at the present time are briskly engaged on overhaul work.

The firm of C. H. Bailey continue to secure a large share of business, and are well employed at their establishments here with general repairs.

Departure of the "Terra Nova."—Laden with coal for her owner's account, the ex-Antarctic ship *Terra Nova* took her departure from Cardiff on 15th August for Halifax, N.S. She will subsequently be engaged in the whaling business at Labrador, and so will return to her original employment. The unobtrusive nature of her departure was in striking contrast to the enthusiastic character of her reception on her arrival here two months ago.

Death of Mr. William Jones, J.P.—It is only two months since we recorded the appointment of the managing director of the Channel Dry Dock Co. to the magistracy of the city of

Cardiff. Since then events have succeeded each other rapidly, and it is now our melancholy duty to record his death, following on an operation for appendicitis. The deceased gentleman was one of the best-known representatives of the ship-repairing trade in this country, and it was his privilege to be in control of the largest combination of purely ship-repairing establishments in this country, and probably in the world. The esteem in which the late Mr. Jones was held was strikingly shown by the representative character of the vast concourse at the Cardiff Cemetery, and the funeral was described as the most impressive and largest cortege ever witnessed in Cardiff. Another proof of the extreme popularity of the deceased gentleman was exhibited in the general suspension of work at the docks early on the day of the funeral, in order that representatives of the varied interests with which the late Mr. Jones was identified might attend the funeral. His loss will be widely felt in Cardiff, both in business and private life.

Dry-dock Appointment. — The directors of the Cardiff Channel Dry Docks and Pontoon Co. have appointed Mr. William Cocks as manager of that concern and the associated companies, in succession to the late Mr. Wm. Jones, whose assistant he had been for many years.

BELFAST.

From our Own Correspondent.)

State of Trade.—At the present time there is comparative inactivity at the fitting-out wharves, but this must not by any means be taken as an indication of slackness in trade; on the contrary the tonnage under construction just now in the Belfast yards exceeds that at any other period in the history of local shipbuilding.

Messrs. Harland & Wolff.—The fitting out of the Pacific Steam Navigation Co.'s new liner *Andes* is proceeding rapidly, and the next launch from the Queen's Island—which will be within a few weeks, from the south end of the yard—will be that of the *Ormeda*, a vessel of similar dimensions for the same owners. Messrs. Harland & Wolff have not for some little time past had much repair work of importance, but at present they have the steamer *Maine* in hand for reboilering, repairs and structural alterations. The *Maine* was until recently the *Sierra Blanca*, owned by the Sierra Shipping Company, of Liverpool, from whom she has been purchased by the Atlantic Transport Company. Extensions are still the order of the day with regard to the Queen's Island premises, and several new buildings in the engine works are at present in course of erection, whilst piling operations have already been begun on the ground recently acquired from the Harbour Commissioners.

Messrs. Workman, Clark & Co. have recently secured the order for the construction of two large steamers for Messrs. Alfred Holt & Co., which, it is stated, will exceed in point of size any vessel yet built for this Company. A few weeks ago Messrs. Workman, Clark & Co., despatched the new steamer *Eumaeus*, built by them for the same owners. They have several vessels nearing the launching stage.

The Kongo.—The Japanese battle-cruiser *Kongo* left Belfast after being in dry dock for a week, for final painting and touching up. Whilst off Black Head, before reaching Belfast, a torpedo was accidentally lost overboard, and, not being charged with compressed air, it sank in about 20 fathoms. A reward of £200 was offered for its recovery, but up to time of writing efforts to locate it have proved unsuccessful.

Messrs. Maccoll & Co. have recently had a good run of repair work. During the past month they have had the steamers *Balniel II.*, *M. J. Craig*, *Helen Craig*, *Eveleen*, *Parkmore* and *Saint Katherine* in dry dock for overhaul and repairs, and have executed deck repairs on the Whitby steamer, *John H. Barry*.

The Harbour.—In last month's issue reference was made to the negotiations pending between the Harbour Commissioners and Messrs. Harland & Wolff with regard to the construction of new deep-water fitting-out wharves. The terms on which the former proposed to undertake the necessary expenditure were that Lord Pirrie should agree on behalf of his firm to take up £60,000 worth of Harbour stock to meet the cost, and these conditions have been accepted, the purchasing price of each £100 certificate of stock to be £95, this being the lowest figure at which the Commissioners have any statutory power to sell. A wharf 1,000 feet long will be constructed at the East Twin Island, with a low-water depth of 32 feet, and 40 feet at high water. Part of the Twin Island will have to be cut away for the erection of this wharf, and the operations will be of a very extensive nature. The building of a retaining bank for the dredgings has already been started upon. This embankment will start at a point east of the Twin Island and will finish abreast of the south-east corner of Messrs. Harland & Wolff's engine works. It is likely that another wharf will be put up in the Musgrave Channel on the same terms.

LAUNCHES AND TRIAL TRIPS.

NAVAL LAUNCHES.

H.M.S. Porpoise.—On July 21st, H.M.S. *Porpoise*, one of the ocean-going torpedo-boat destroyers, designed and built for the British Admiralty by Messrs. John I. Thornycroft and Co., Ltd., was launched from the firm's Woolston yard. Messrs. Thornycroft recently launched a sister ship belonging to the same programme, and two others, already in an advanced state, will follow at short intervals. The vessels are about 260 ft. long and 26 ft. 6 in. beam, and are fitted with turbines and water-tube boilers burning oil fuel. They are to have a speed of 31 knots. The hulls, propelling machinery and boilers are, as is Messrs. Thornycroft's practice, being built complete in their own yard.

Ulysses.—On August 18th, Messrs. Swan, Hunter & Wigham Richardson, Ltd., launched from their Wallsend yard H.M.S. *Ulysses*, a new torpedo-boat destroyer. The vessel is a sister ship to H.M.S. *Sarpedon*, launched from the same yard last June and now nearly ready to undergo her trials at sea. These vessels were ordered under the naval programme of 1912-13, and are similar to H.M.S. *Shark*, *Sparrowhawk* and *Spitfire*, constructed by the same builders under the naval programme of 1911-12. The propelling machinery of the *Ulysses* consists of two sets of Carsons impulse and reaction turbines, each driving one propeller on a separate shaft. The engines and boilers have been constructed by the Wallsend Slipway and Engineering Co., Ltd. Oil-burning apparatus is fitted to the boilers.

Havock.—On August 18th, Messrs. Yarrow & Co., Scotstoun, Glasgow, launched the torpedo-boat destroyer *Havock*, which they have built for the British Government. The *Havock*, which is of 935 tons displacement, 24,000 i.h.p. and 32 knots speed, will be engined by the builders.

LAUNCHES—English.

Arabistan.—On July 4th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Arabistan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 412 ft. 6 in.; breadth, 53 ft. 6 in.; and depth, 29 ft. 7½ in. She is a handsomely-modelled vessel with two decks laid, and having poop, long bridge and topgallant forecastle, with very tasteful cabin accommodation in houses on the bridge-deck for passengers, captain and officers, and is fitted throughout with electric lighting. The vessel has a cellular double bottom and after-peak tank for water ballast, and, in addition, there is a deep tank or hold compartment fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,200 tons. The whole of the outfit, including steam windlass, steam-steering gear, two derricks to lift 30 tons each, twelve steam winches with return exhaust to winch condenser of the "Contraflo" type, are of the most approved description. The machinery is made by The Central Marine Engine Works of the builders, being of the triple-expansion type with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a "Contraflo" main condenser, Weirs' feed pumps and heater, and three large steel multitubular boilers working by Howden's forced draught at a pressure of 180 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Archibald Walker on behalf of the owners.

Baldersby.—On July 4th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*:—Length, 358 ft. 6 in.; breadth, 50 ft. 10 in.; depth, 25 ft. 8 in. The vessel will be classed 100 A1 at Lloyd's, having main

deck, poop, long bridge and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle, also in the fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick warping windlass, stockless anchors, steam-steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 1,500 i.h.p., having two steel boilers 16 ft. by 10 ft. 6 in., 180 lbs. pressure of steam.

Bridlington and Speeton.—On July 7th, there were launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, two steel screw fleeters, *Bridlington* and *Speeton*, the principal dimensions being 112 ft. by 22 ft. 6 in. by 13 ft. 2 in. moulded. The vessels have been built to the order of Messrs. The Hull Steam Fishing & Ice Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull.

Eustace.—On July 7th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from the Harbour Dockyard, West Hartlepool, the steel screw steamer *Eustace*, built for Messrs. The Pyman Steamship Co., Ltd., West Hartlepool (Messrs. George Pyman & Co., managers). The dimensions of the vessel are 387 ft. by 51 ft. 3 in. by 26 ft. 10 in. depth moulded, carrying over 7,400 tons on a moderate draught. She is built to Lloyd's highest class on the shelter-deck principle, having two complete steel decks, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames without side stringers, giving exceptionally clear holds for the stowage of bulky cargoes. Wood grain divisions are fitted throughout the holds to Board of Trade requirements, and the steamer is divided into seven watertight compartments by means of six transverse bulkheads. Large hatches are provided, together with the latest facilities for the rapid loading and discharging of cargo, including ten powerful steam winches exhausting into a winch condenser and ten derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand-gear aft. The captain, officers and engineers are berthed in large houses amidships, steam-heated, the crew and firemen being berthed in the forecastle. Bulwarks are fitted forward and amidships for protection of the accommodation, and the lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple-expansion engines will be supplied and fitted by Messrs. Blair & Co., Ltd., Stockton-on-Tees, having cylinders 25 in., 42 in. and 68 in. by 48 in., with two large single-ended boilers and one auxiliary boiler, all connected to the main engines, 180 lbs. pressure.

St. Patrick.—On July 7th, Messrs. John I. Thornycroft and Co., Ltd., launched from their yard at Southampton, a passenger and express cargo steamer 180 ft. long by 27 ft. by 7 ft. depth, built of steel, to the order of the Crown Agents for the Colonies, under the superintendence of their consulting engineers, Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. The vessel is divided into eight watertight compartments, and is provided with teak decks, mails and passenger accommodation, and will be propelled at a high speed by triple-expansion engines by the same builders, constructed of material complying with the Admiralty Standard of Tests. She is fitted with electric light and all recent improvements, and will be a valuable addition to the fleet of this rapidly expanding colony of Trinidad, for which she is intended.

Valegarth.—On July 8th, Messrs. Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough-on-Tees, the fine steel screw cargo steamer *Valegarth*, which they are building to the order of Messrs. R. & J. H. Rea, of Liverpool, Cardiff, Southampton, etc., to fulfil the very special requirements of the owners' extensive coal-carrying trade. The vessel is being constructed under special survey to class 100 A1 at Lloyd's. Her principal dimensions are 252 ft. by 36 ft. 3 in. by 21 ft. moulded, and she will have a deadweight carrying capacity of about 2,300 tons on a light draught of water. Saloon and accommodation for captain, officers and engineers will be contained in bridge, with chart-room on top, above which will be the wheel-house and pilot bridge, while the crew will be berthed in forecastle. Triple-expansion engines having cylinders 18 in., 30 in. and 50 in. by 36 in. stroke, supplied with steam by two large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. The hull and engines are being constructed under the superintendence of Mr. H. W. L. Shubrook, the owners' superintendent engineer, assisted by Mr. L. M. Hawson, the owners' resident inspector. The trial trip was run on the 12th Aug., and was very successful.

Manchester Civilian.—On July 8th, Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., launched from their Middleton Shipyard the steel screw steamer *Manchester Civilian*, built for The Manchester Liners, Ltd., Manchester. The dimensions of the vessel are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peak tanks, the tank under the engines and boilers being arranged as a trimming tank. The vessel is constructed with deep frames, without side stringers, giving exceptionally clear holds for the carriage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout to Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten special type steam winches exhausting to a "Contraflo" winch condenser, and twelve Mannesmann steel derricks. A powerful quick-warping steam windlass is fitted forward, and combined steam and hand-steering gear is fitted aft (Wilson & Pirrie type), with telemotor attachment to the bridge amidships. The captain, officers and engineers are berthed in large houses amidships, a separate berth being provided for each officer and each engineer, a special room for apprentices, and a hospital is also provided amidships for use in case of emergency. Special attention has been paid to the accommodation for the sailors and firemen, these spaces being sub-divided so that the men are not unnecessarily disturbed when changing watches. Steam heating is fitted throughout the accommodation, and special attention has also been paid to the lighting and sanitary arrangements, the most improved methods being adopted. A large ice house is fitted in the after end of the bridge for meat, fish, etc. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardson's" standard triple-expansion engines with cylinders 25 in., 40 in. and 68 in. by 48 in. stroke, steam being supplied by three large single-ended boilers working under natural draught at a pressure of 180 lbs. per square inch. The specification is very complete and embraces "Contraflo" main and auxiliary condensers and a cascade feed water filter and heater in which the whole of the auxiliary exhausts are utilized for feed heating. The auxiliaries include a Morison's evaporator, large ballast pump, vertical auxiliary feed pump float, controlled from the cascade filter, and independent pump for the auxiliary condenser. In the stokehold, diamond blowers are fitted for cleaning the boiler tubes, and the fire doors and the furnace fittings are of special design. The propeller is of the solid four-bladed type, and made entirely of manganese bronze. During construction the hull and machinery have been under the supervision of Mr. T. Mason Greenip, M.I.M.A. the owner's superintendent. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamels have been supplied throughout the bunkers, tanks, etc., and their patent "Bitumastic" covering to the tank tops.

Gifford.—On July 8th, Messrs. William Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, the steamship *Gifford*, built to the order of Messrs. Houlder, Middleton & Co., London. The dimensions of the vessel are—length 434 ft., breadth 54 ft., moulded depth 29 ft., deadweight capacity 9,250 tons. Messrs. Doxford are supplying the engines and boilers, and classification is with Lloyd's in their 100 A1 class. Capt. R. A. Gray has superintended the construction on behalf of the owners.

Visegrad.—On July 8th, a handsome twin-screw steamer for service in the Adriatic was launched from the Neptune

Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The vessel is being constructed to the order of the Ungaro-Croata Steam Navigation Co., Ltd., of Fiume, for their main and passenger service between Fiume and ports on the coast of Dalmatia. The steamer is about 260 ft. in length by 34 ft. beam by 15 ft. 6 in. depth moulded, and is being built to attain the highest class in Lloyd's register. There will be accommodation for 75 first-class passengers, including large dining saloon, deck saloon for smoking and music, ladies' room, entrance house, and stateroom. These passengers also have a fine promenade on the boat deck, as well as a sheltered promenade on the shade deck. Many of the state rooms are for one person each, and are fitted with a four-post silver-plated bedstead. The thirty-four second-class passengers will have a dining saloon forward, with ladies' room and state rooms below. The engines and boilers are also being constructed by Messrs. Swan, Hunter and Wigham Richardson, Ltd., and consist of two sets of four-crank, balanced triple-expansion engines. They will be supplied with steam from three boilers fitted with forced draught. It is anticipated that they will drive her at over 17 knots per hour. A searchlight will facilitate navigation at night, and the vessel will also be provided with steel lifeboats, Welin davits, steam-steering and telemotor gear, and she will be in every respect a most up-to-date and efficient first-class passenger and mail steamer.

Ascain.—On July 8th, Messrs. Wood, Skinner & Co., Ltd., of Bill Quay, Newcastle-on-Tyne, successfully launched from their shipbuilding yard a finely modelled new steel screw steamer specially designed for the carrying of coal cargoes. The vessel is of the long raised quarter deck type with a short bridge and topgallant forecastle and is of the following dimensions, *viz.* :—Length, b.p., 260 ft. ; beam, 37 ft. 6 in. ; depth moulded, 18 ft. 7 in., with a deadweight carrying capacity of 2,500 tons on 17 ft. 2 in. mean draught of water. Ample provision is made for water ballast in the cellular double bottom all fore and aft, and also in the fore and after peak tanks. The saloon and captain's accommodation is arranged under the bridge deck amidship, with chart-room and spare berth in deck house above. The officers and engineers are berthed in side houses under the after end of the bridge deck and the seamen and firemen in the topgallant forecastle. The vessel has specially large self-trimming hatches and will be fitted with all the latest improvements for the rapid loading and discharging of cargo. She will have two large main boilers and triple-expansion engines of sufficient power to give a speed of 10½ knots loaded. This machinery has been constructed and will be fitted by Messrs. North-Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne. Both the ship and engines have been built to the requirements and under the special survey of Lloyd's for their highest classification. The trial trip was run on the 1st Aug., the machinery working very satisfactory and an average speed of 11 knots being maintained.

Ngakuta.—There has been launched from the yard of Messrs. Smith's Dock Co., Ltd., South Bank-on-Tees, the finely-modelled steel screw steamer *Ngakuta*, built to the order of Messrs. the New Zealand Shipping Co., Ltd., the dimensions of the vessel being :—Length, 275ft. ; breadth, 39ft. ; and moulded depth, 18ft. 5in. The vessel has a carrying capacity of over 2,300 tons of cargo on a shallow draught. She has four holds, with very large hatchways, for the rapid handling of coal cargoes, and is fitted with double bottom throughout. The propelling machinery is being constructed by Messrs. Richardsons, Westgarth & Co., Ltd., of Middlesborough. The engines have been built to a very high-class specification. Both hull and engines have been built to Lloyd's highest class.

South Pacific.—On July 16th, Messrs. Joseph L. Thompson and Sons, Ltd., of the North Sands Shipbuilding Yard, Sunderland, launched the above-named vessel, which has been specially constructed to the order of Messrs. The Pacific Shipping, Ltd., of Sunderland, and is the sixth vessel Messrs. Thompson have constructed to the order of this firm. The principal dimensions are :—Length, 366 ft. ; breadth extreme, 51 ft., and depth moulded 26 ft. 5 in. The vessel has been constructed to Lloyd's highest class, and is of the single-deck type with a poop, long bridge and forecastle, and has been designed to have a large deadweight carrying capacity on a moderate draught of water. In addition to the usual transverse bulkheads, longitudinal steel bulkheads are fitted, with wood in way of the hatchways. The accommodation for the captain, officers, engineers, etc., is in houses amidships, the seamen and firemen being berthed forward. There are ten steam winches, ten derricks and large hatchways, ensuring the rapid handling of cargoes. The deck machinery is supplied with steam from a large marine type donkey boiler. The lifeboats are of extra large size, complying with the latest requirements of the Board of Trade. The propelling machinery has been constructed by Messrs. John Dickinson and Sons, Ltd., of Sunderland, the sizes of the cylinders being 25 in., 41 in., 68 in. by 48 in. stroke, with three large boilers working at 180 lbs. pressure. The launch was most successful in every way. During construction the vessel and engines have been under the personal supervision of Mr. Arthur E. Greenwell.

Holtye.—On July 18th, an important addition was made to the fleet of F. S. Holland, Esq., of London, in the fine steel screw steamer *Holtye*, which was launched from the yard of the Northumberland Shipbuilding Co., Ltd., Howden-on-Tyne, the vessel being about 420 ft. in length and 53 ft. beam, with two complete steel decks including the shelter deck all fore and aft, with a cargo carrying capacity of 8,400 tons. The vessel is constructed in the most up-to-date manner, *viz.*, on the deep bulb angle frame principle, has clear holds and is fitted with the latest improvements and appliances to make her in every way a first-class vessel. A large quantity of water ballast is carried in the cellular double bottom and large after peak tank. The shelter 'tween deck is of exceptional height and is so arranged that a large number of emigrants, troops or horses can be carried. The loading and discharging facilities are complete, the steamer having ten derricks and ten winches to ensure the most expeditious handling of cargo. She has been constructed to a fine model with a view to rapid speed and economy in fuel, and the machinery will be supplied by Messrs. Blair & Co., Ltd., Stockton-on-Tees, consisting of engines with cylinders 26½ in., 44 in., 72 in. by 48 in. ; three boilers 15 ft. 6 in. by 11 ft. 9 in., 180 lbs. pressure. During construction the vessel has been superintended by Mr. J. French. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels have been applied throughout the bunkers, engine and boiler-room bilges, also engine and boiler-room tanks.

Shirley.—On July 18th, a new steamer, named *Shirley*, which has been built to the order of Messrs. Houlder, Middleton & Co., Ltd., was launched at Sunderland. Her leading dimensions are :—Length, 415 ft. ; breadth, 54 ft. 4 in., and depth, moulded, 36 ft. She is classed 100 A1 at Lloyd's, and has complete shelter deck. The loading and discharging facilities are specially suitable for the rapid handling of cargo, eight derricks being fitted on mast tables and two on derrick posts for the purpose of working the five hatches, and a 30-ton derrick is also provided to work from either mast. The main engines have cylinders 27 in., 45 in. and 74 in., by 51 in. stroke, steam being supplied by three large boilers working at a pressure of 180 lbs. per sq. in.

Winamac.—On July 19th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby shipbuilding yard, Thornaby-on-Tees, a fine and handsomely modelled two-deck screw steamer of the following dimensions, *viz.* :—427 ft. by 53 ft. 4 in. by 31 ft. to upper deck. She is built of steel to the highest class in Lloyd's Registry, under special survey for the carrying of oil in bulk, there being nine tanks with a centre oil-tight division forming eighteen compartments for oil cargo, each having large expansion trunk in 'tween decks. For the provision of carrying lighter oil in summer there are five summer tanks on each side of the 'tween decks, whilst oil fuel is carried in the cross bunker aft, and in the fuel tank forward. Water ballast is fitted in double bottom under engines and boilers and in both peaks. Special attention has been given to the accommodation for the master, officers and crew, who are all provided with very superior rooms and comfortable quarters, the master and officers being on bridge deck amidships, the engineers in poop, and the crew in the forecastle, whilst the Marconi room is on the upper bridge amidships. Her engines are of the quadruple-expansion type and have been constructed by the North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 24 in., 34 in., 49 in., 71 in. by 48 in. stroke, with three large boilers working at 220 lbs. pressure, fitted with Howden's forced draught. The boilers have been arranged to burn either coal or oil, as the occasion requires.

A double set of oil pumps are being fitted in the pump-room amidships, capable of dealing with 600 tons per hour. A complete installation of electric light on the double wire system has been fitted throughout by Messrs. J. H. Holmes and Co., Newcastle. A Marconi wireless installation is also installed. The vessel, which has all the latest arrangements and improvements for carrying oil in bulk, has been built to the order of The Tank Storage and Carriage Co., Ltd., London. The vessel has been built under the supervision of Messrs. Morton, Neish & Driver, whilst Mr. Hardy has been the resident hull inspector. This is the largest oil vessel Messrs. Craig, Taylor & Co., Ltd., have as yet built, whilst they have a sister ship to lay down in the same berth.

Girl Kathleen.—On July 19th, Messrs. Crabtree & Co., Ltd., of Great Yarmouth, launched from their yard a finely-modelled steam herring drifter of the following dimensions: Length b.p., 86 ft.; breadth moulded, 18 ft. 6 in.; depth moulded, 9 ft. 9 in. This vessel has been built to the order of F. J. W. Salmon, Esq., of Great Yarmouth, and is the second vessel built for him by this firm. She is to be fitted with triple-expansion engines of the following dimensions:—10 ft by 15 ft. by 24 ft. by 16 in. stroke, which are also being built by Messrs. Crabtree & Co., Ltd. Steam will be supplied by a cylindrical boiler of the marine type, 9 ft. 9 in. diameter by 9 ft. long, built to Lloyd's for a working pressure of 180 lbs. The vessel is to be fitted with Crabtree's patent steering gear, which is quite a new departure from the original type. The hull and engines have been completed under the supervision of Mr. Percy Page, of Great Yarmouth.

Kandahar.—Messrs. Swan, Hunter & Wigham Richardson, Ltd., have successfully launched from the Wallsend shipyard the steamship *Kandahar*, this being the fifteenth vessel built by them for the steamship lines controlled by Sir John Ellerman. The *Kandahar* is a cargo vessel of high class, and will be attached to and is to run for the Bucknall Line fleet. Her leading dimensions are 449 ft. long, 55 ft. 6 in. wide, by 34 ft. deep, and she carries about 10,400 tons on a moderate draught. The plans of the vessel and her construction have been supervised by Mr. Alex. Dalrymple, the superintending engineer of the Ellerman Lines, assisted by Mr. R. Sharp. The vessel will be equipped with all modern appliances for rapid discharge and loading of cargo. She is built with a cruiser stern, poop, long bridge and forecastle. The poop is utilized for the accommodation of the seamen and firemen. Amidships on the bridge there are commodious cabins for engineers and officers, together with a small number of comfortable state-rooms. The triple-expansion engines are being built by the Wallsend Slipway and Engineering Co., together with three large single-ended boilers, which are to work under a pressure of 220 lbs. per sq. in., with forced draught.

Polo.—On July 19th, there was launched from the yard of Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, a finely-modelled steel screw steamer. The vessel, which is named the *Polo*, is built to the order of Messrs. Thos. Wilson, Sons & Co., Ltd., and is intended for the Mediterranean and Baltic trades. The length of the vessel is 300 ft., breadth moulded, 44 ft. 6 in., depth moulded, 20 ft. She has been constructed of steel throughout to the British Corporation highest class, and to the latest Board of Trade requirements. The vessel is of the shelter-deck type with saloon deck house amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has two steel pole masts and very efficient appliances for the speedy handling of cargo, the derricks, ten in number, being capable of dealing with heavy lifts; the derricks will be worked by powerful steam winches of the most up-to-date description, and a latest improved steam windlass by Messrs. Emerson, Walker & Thompson is also fitted. The steering engine is placed in the deck house aft, and is controlled by the telemotor system from the navigating bridge. Powerful hand-screw gear is also combined with the steam steering engine, both of which have been supplied by Messrs. Amos & Smith, Hull. The work throughout the vessel is of the very best description, with all the latest improvements. Triple-expansion engines are provided by the builders, steam being supplied by two large boilers designed to drive the vessel at a good speed on a minimum coal consumption.

LAUNCHES—Scotch.

Cyclops.—On July 18th, there was launched, at Paisley, a powerful steel screw tug and salvage steamer, which has been built for Montevidean owners. The steamer is fully equipped for her trade, having a wireless installation, electric light, including searchlight, salvage pumps, steam windlass, capstan, steering gear etc. On leaving the ways she was named *Cyclops*.

Ant.—On July 28th, there was launched from the yard of Messrs. Murdoch & Murray, Ltd., Port Glasgow, a steel screw steamer of the following dimensions:—Length, 170 ft.; breadth, 33 ft.; depth, 16 ft. 3 in. The vessel, which is named *Ant*, has been built to the order of the Admiralty, and has two complete decks and part third deck. Roomy holds are provided for light cargoes and very ample ballasting arrangements have been embodied in the vessel, which has also a complete outfit of deck machinery and electric light. The new steamer has been built for a special service in the South of England, and will be fitted with triple-expansion engines and large boiler of sufficient power to obtain a speed of 11 knots per hour.

Triton.—On July 30th, Messrs. Dunlop, Bremner & Co., Post Glasgow, launched the single screw steamer *Triton*, which they have built to the order of the Koninklijke Stoomboot Matschappij, Amsterdam, for their general cargo trade. The vessel is 293 ft. in length, 43 ft. in breadth, and 29 ft. 6 in. in depth, and is of about 1,920 tons gross. She will be supplied by the builders with triple-expansion engines, having cylinders 22 in., 35 in. and 59 in. in diameter respectively, with a stroke of 39 in. Steam will be supplied by two large single-ended boilers, fitted with Schmidt's superheaters, working in conjunction with Howden's forced draught.

Holme Rose.—On August 2nd, a fishing steamer named *Holme Rose* was launched by Mr. W. R. Mackintosh, Buckie, for Messrs. J. & A. Barron, Nairn. The vessel, which is 85 ft. in keel, will be supplied with triple-expansion engines by Messrs. John Lewis & Sons, Aberdeen.

Bucket Dredger "No. 1."—On August 6th, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched complete and ready for work the powerful twin-screw Bow-well barge-loading bucket dredger *No.* 1, the third of eight dredging vessels which they have under construction to the order of the Russian Government. The vessel has been built under the survey of Bureau Veritas for classification in their register, and under the inspection of Captain M. A. Schmidt, I.R.N. The dredger is fitted with two sets of compound-surface condensing engines, each driving its own propeller. Steam is supplied by two steel multitubular boilers constructed to Lloyd's requirements for 120 lbs. working pressure. The engines are arranged to give two speeds of buckets so that either set is available for driving the dredging gear. The bucket ladder is designed for dredging the vessel's own flotation and to a depth of 40 ft. below water level. The bucket dredging capacity is 1,000 tons per hour. The vessel is lit throughout with electric light and the cabins are all steam heated.

Steam Drifter.—On August 18th, a steam drifter was launched by Messrs. Scott & Yule, Fraserburgh, to the order of Messrs. John Buchan, George Duthie, James M'Lean and Charles Sim, all fishermen, of Rosehearty. The vessel, which is 88 ft. in length between perpendiculars, will be engined by Messrs. John Lewis & Son, Aberdeen.

Strathnethy and Strathdunie.—On August 18th, Messrs. Hall, Russell & Co., Aberdeen, launched two trawlers for the Aberdeen Steam Trawling and Fishing Co., Aberdeen. The vessels are of the following dimensions:—Length, between perpendiculars, 115 ft.; breadth, 22 ft.; and depth, 13 ft. They were named *Strathnethy* and *Strathdunie* respectively.

Carlo.—On August 27th, the Clyde Shipbuilding and Engineering Co., Port Glasgow, launched the cargo steamer *Carlo*, which they have built to the order of Messrs. Thomas Wilson, Sons & Co., Hull. The vessel, which has been built to the highest class of the British Corporation, is 310 ft. in length, 44 ft. 6 in. in breadth, 20 ft. 3 in. in depth moulded, and of 2,100 tons gross. A feature of the vessel is her cruiser stern. The builders will supply the machinery.

TRIAL TRIPS.

Osage.—Late in June, the oil tank steamer *Osage*, built at the Hebburn Yard of Palmers Shipbuilding and Iron Co., Ltd., to the order of the Deutsch Amerikanische Petroleum Gesellschaft of Hamburg, was taken to sea for official trials. The vessel is over 380 ft. long, and carries a deadweight of

over 7,300 tons on a light draught. She has been built on the Isherwood system of framing, and is classed 100 A1 Lloyd's under special survey, fitted and finished to the Seemannsordiong and See-Berufsgenossenschaft and to Suez Canal requirements. The engines are quadruple-expansion, 20¼ in., 29¼ in., 42¼ in., 61 in. by 45 in. stroke, steam being supplied by two large single-ended boilers fitted to burn coal and oil fuel, working at a pressure of 215 lbs. per square inch; also large donkey boiler fitted in casing for supplying steam to the auxiliary machinery. The vessel was taken for a number of runs over the measured mile, and continued running for six hours, the engines working very satisfactorily throughout, and giving a speed considerably in excess of the contract requirements. For Launch, see July issue.

Paris.—Early in July, the geared turbine steamer *Paris*, built by Messrs. Denny, Dumbarton, for the Newhaven and Dieppe service of the London, Brighton and South Coast Railway, and the Western State Railway of France, completed her builders' trials, accomplishing a mean speed on the measured mile of 24·745 knots. In view of the dimensions of the vessel, 300 ft. overall, and draught under 9 ft. 6 in., the speed is considered excellent. For Launch, see May issue.

Sir Hugh Bell.—The trial trip has recently taken place of the new paddle steamer *Sir Hugh Bell*, which has been built at South Shields, to the order of the Tees Conservancy Commissioners. She has been designed generally for sea and harbour towage, but specially as a tender and surveying vessel. The general dimensions are:—Length, 115 ft.; beam, 21 ft.; and depth, moulded, 11 ft. The propelling machinery consists of one pair of side lever surface-condensing paddle engines of the disconnecting type, the cylinders being 32 in. diameter by 54 in. stroke. Steam is supplied by two multitubular boilers.

W. H. Dwyer.—The steamer *W. H. Dwyer*, recently launched by the Sunderland Shipbuilding Co., has been to sea on her official trial. Specially built for the Canadian Lake service, the vessel's principal dimensions are:—Length, 257 ft.; breadth, 42 ft. 8½ in.; depth, 18 ft. 6 in. She has been constructed to the order of Messrs. Dwyer & Hennessy, of Ottawa, Canada. During the trial a mean speed of 10¼ knots was easily maintained. For Launch, see June issue.

Scythian.—On July 2nd, the new steel screw steamer *Scythian*, which has been built at Stockton-on-Tees, made her official trial trip in Tees Bay. The steamer has been constructed to the highest class at Lloyd's, and is of the two-deck type, the second deck being 9 ft. below the upper deck. She is 403½ ft. long and has a deadweight carrying capacity of 7,925 tons on her summer freeboard. The engines are of the triple-expansion type, the cylinders being 26 in., 43 in. and 71 in. by 48 in. stroke, steam being supplied by three single-ended boilers. After some very satisfactory trial runs, during which the vessel attained a speed of over 12 knots, she proceeded to the Tyne to load.

Ingoma.—On July 3rd, the finely-modelled steel screw steamer *Ingoma*, built by Messrs. David & William Henderson & Co., Ltd., Partick, Glasgow, to the order of Messrs. Thos. & Jas. Harrison, Liverpool, for their Harrison's Rennie Line of passenger and cargo steamers trading between London and South Africa, underwent her trials on the Firth of Clyde. A mean speed of about 15 knots was easily maintained, and everything passed off to the satisfaction of owners and builders. All the vessel's boilers, cylinders and steam pipes have been covered with Messrs. Matthew Keenan & Co.'s Patent non-conducting composition. On the Friday evening following the trials a large party of the owners' guests joined the vessel at Gourock and proceeded on a cruise round to Middlesbrough. The vessel behaved admirably on the voyage. For Launch, see June issue.

San Gregorio.—The trials have been run by the *San Gregorio*, one of a number of important ships for carrying oil in bulk which Messrs. Swan, Hunter & Wigham Richardson, Ltd., have had in hand for the Eagle Oil Transport Co., of London. On the trial trip everything worked without a hitch and to the satisfaction of all concerned. The owners were represented by Mr. Frank Rendall, together with Mr. Walter Bradney, of Messrs. Jacobs & Barringer, London, the owners' consulting architects and engineers. For Launch, see July issue.

Colon.—On July 14th, the trial trip took place of the powerful steel screw tug and service vessel *Colon*, which has been designed and constructed by Messrs. James Pollock, Sons & Co., Ltd., of London and Liverpool. The dimensions of the *Colon* are as follows:—Length, 64 ft. 8 in.; breadth, 14 ft.; depth, 6 ft. 10 in. This vessel, which is intended for the West Coast of South America, obtained a satisfactory speed of 9·6 miles. The *Colon* is fitted with compound surface-condensing engines, having cylinders 10 in. and 22 in. diameter by 15 in. stroke and a return tube boiler with a working pressure of 130 lbs. per sq. in. The fact of Pollock's patent stern frame being fitted added largely to the success of the trial. It is interesting to note that the order for this vessel was the outcome of the satisfaction which the tug *Lola* has given to her owners, and of which the *Colon* is a duplicate. The *Lola* was supplied in 1911 by Messrs. James Pollock, Sons & Co., Ltd., who are also constructing two further duplicates of these vessels for the same coast, one of them, *viz.*, *America*, being for the same owners, and will shortly be ready for delivery.

African Transport.—On July 17th, the steel screw steamer *African Transport*, which has been built by the Northumberland Shipbuilding Co., Ltd., to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd., London, left the Tyne for her official trip. The trial trip proved in every way satisfactory and a speed of 12¾ knots was obtained. For Launch, see June issue.

Atherstone.—On July 19th, the s.s. *Atherstone*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Thornaby-on-Tees, was taken to sea for her trial trip, which proved highly satisfactory. During the whole of the trip everything worked with the greatest smoothness, and over a series of runs the vessel maintained an average speed of 11¾ knots. The owners were represented by Mr. Charles Jones, consulting engineer, of Cardiff, who expressed himself as being very highly pleased with the ship and engines. Immediately after the trial the vessel proceeded to Hull under the command of Captain Jenkins. For Launch, see July issue.

Tatra.—During July this vessel was taken for a six-hour trial. She has been built by Messrs. J. Priestman & Co., Ltd., Sunderland, to the order of Messrs. The Hungarian Levant Steamship Co., Ltd., Budapest, and is a steel screw steamer of the following dimensions—375 b.p., 53 ft. beam, 26 ft. 8 in. depth moulded, and is designed to carry 7,500 tons deadweight, including bunkers on a summer draught of 23 ft. Besides the usual steam windlasses and steering gear she is well supplied with winches for the rapid handling of cargo. Her engines, of the triple-expansion inverted type by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, exhaust into a "Contraflo" condenser and have cylinders 24 in., by 39 in. by 66 in. by 45 in. stroke. Steam at 180 lbs. is supplied from three large single-ended boilers. The vessel is well provided with auxiliary machinery, including Weir's feed pumps, Morrison evaporator and cascade filter and feed water heater. A separator circulating pump of the high grade centrifugal type by Messrs. Watson and a powerful ballast pump by Messrs. Hall have been fitted. The trial proved satisfactory. The vessel is constructed to Lloyd's highest class and to conform to the requirements of the Hungarian Government.

Durley Chine.—On July 25th, Messrs. Osbourne, Graham and Co., Hylton, Sunderland, sent to sea for her official trial the steel screw steamer *Durley Chine*, which they have specially constructed to the order of Messrs. H. G. Harper and Co., of London and Cardiff. During the trial the machinery worked very satisfactorily and the vessel attained a speed of 11¼ knots. Among the company on board were Messrs. Petersen & Matthews, partners in the firm of Messrs. H. G. Harper & Co., Captain Anstey, the commander of the vessel, and Mr. G. W. Kitching, of 1, Lime Street Square, London, under whose supervision the hull and machinery were constructed. For Launch, see August issue.

Ocean Transport.—On July 25th, the steel screw steamer *Ocean Transport* proceeded on her official trial. The vessel has been built by Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., to the order of Messrs. Furness, Withy and Co., Ltd., for Messrs. The Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., Ltd., managers), London. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12½ knots being attained, and the vessel afterwards proceeded on her voyage. For Launch, see July issue.

Sudmark.—On July 26th, the s.s. *Südmark*, built and

engined by Messrs. William Doxford & Sons, Ltd., Pallion, Sunderland, to the order of the Hamburg-Amerika Line, Hamburg, ran a successful trial at sea, when a speed of 12½ knots was maintained. On the trial the owners were represented by Captain Selmer, Herr Köhler and Herr Kravack. For Launch, see July issue.

Penhallow.—On July 26th, the handsome steel screw steamer *Penhallow*, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Mr. Richard B. Chellew, of Truro, had her trial trip. The owner was represented by Mr. John Chellew and Mr. Richard Rapson, under whose superintendence the ship and her machinery have been built. The performance of ship and machinery gave entire satisfaction to all concerned, the average speed obtained being 12½ knots. For Launch, see July issue.

Eumaeus.—On August 1st, this new steamer left the Clarence Wharf and proceeded down the Lough to Carrick Roads for machinery tests and speed trials, all of which proved most successful, and the vessel afterwards left for Glasgow to take in coal and part cargo prior to proceeding to Birkenhead to complete cargo for the initial voyage to China and Japan. The *Eumaeus*, built by Messrs. Workman, Clark & Co., Ltd., Belfast, for the Ocean Steamship Co., Ltd., Liverpool (Messrs. Alfred Holt & Co.), is 457 ft. in length, with a gross tonnage of 6,700, and is constructed on the girder system, which ensures increased strength with unobstructed cargo space in the holds, and is thus capable of receiving the largest class of consignments. For Launch, see July issue.

Kathlamba.—On August 2nd, the trial trip of the handsome steel screw steamer *Kathlamba*, built by Messrs. William Gray & Co., Ltd., for the Bucknall Line Section of the Ellerman Lines, Ltd., Liverpool, took place. The owners were represented by Mr. H. Rennie, superintendent of the Bucknall Line, his assistant, Mr. Fotheringham, and Mr. Robert Shart, assistant to Mr. A. Dalrymple, superintendent engineer of the Ellerman Line, Ltd. The performance of the ship and machinery was entirely satisfactory, a speed of 14¾ knots being obtained. For Launch, see July issue.

Keltier.—On August 2nd, the finely-modelled single-deck steamer *Keltier*, built by Messrs. Robert Thompson & Sons, Ltd., at their Southwick Yard, to the order of Messrs. The Antwerpsche Zeevaart Maatschappij Co., Ltd., of Antwerp, proceeded to sea for her official trial. The trial trip was very successful, the engine running with perfect smoothness, easily attaining a mean speed of about 11 knots, and Mr. A. Brys, managing director of the owning Company, who was on board, expressed entire satisfaction with both vessel and machinery. After the trial the vessel proceeded to the White Sea under the command of Captain Palm. For Launch, see August issue.

Westville.—Recently the new screw steamer *Westville*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Balls & Stansfield (Ville Steamship, Ltd.), North Shields, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel proceeded to Harton Staiths to load for Port Said under the command of Captain Robert Murray. Among the company present were Mr. John Readhead and Mr. J. H. Readhead, representing the builders, Mr. A. J. Balls, Mr. Geo. H. Stansfield, Mr. Harry Stansfield, Mr. G. Henry, Mr. G. L. Brown, Mr. S. M. Todd, Mr. H. Bright, Mr. J. P. Walker, Mr. C. English, Mr. J. E. Robson and Mr. A. J. Wotte. This is the sixth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd. For Launch, see August issue.

Ceylon.—On August 16th, the new steamer *Ceylon*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for the Stoomvaart Maatschappij Rotterdamsche Lloyd, Rotterdam, ran her trials on the Firth of Clyde. The machinery was supplied by Messrs. David Rowan & Co., Glasgow. On the completion of the trials, which were in every way satisfactory, the vessel sailed for her loading port. For Launch, see August issue.

Abridgment of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

6792. Revolution direction indicators (electric order telegraphs). In an electric revolution-direction indicator which is combined with the transmitter of an electric engine-room order telegraph, the order telegraph transmitter may be actuated from any part of the engine-room telegraph. The revolution-direction indicator comprises a frame 5, which is carried by a shaft driven from the propeller shaft and bears two electro-magnets, 6, 6*, between the poles of which is situated a copper disc 7. Current is supplied to the magnets through brushes, 15, 16 from the leads 17, 18. The disc 7 is mounted on a shaft 8 bearing a contact-arm 9 moving between stops 11, 12, against a spring 10. Movement of the disc due to the rotation of the magnets causes the arm 9 to engage one of two contacts 19, 20, and thus energize one of two magnets 35, 36, and cause a pointer 31 to indicate 'ahead' or 'astern.'

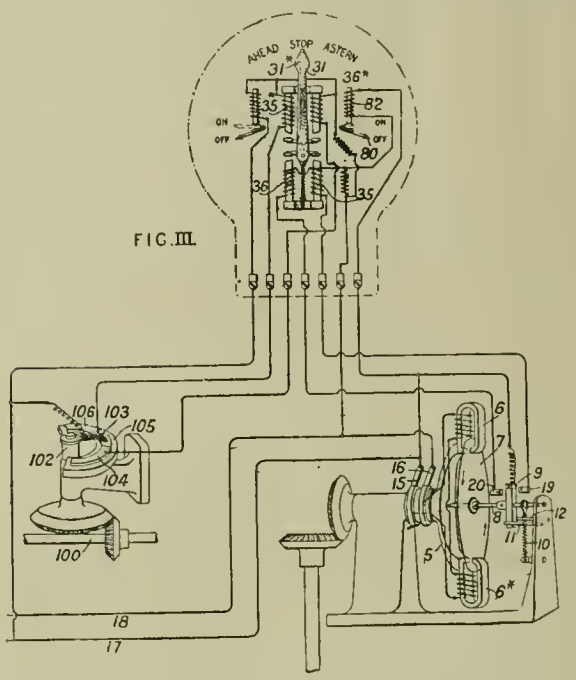


FIG. III.

To indicate whether the magnets are energized when the pointer 31 is at 'stop' a magnet 82 is placed in a shunt circuit between the line wires and operates a pointer 80, showing whether the current is 'on' or 'off' The order telegraph transmitter comprises a shaft 100, connected with any convenient point of the engine-room telegraph, which through a shaft 102 moves a brush 103 over three plates 104, 105, 106. The centre block 103 is insulated, and the other two are connected to magnets 36*, 35*, which operate a pointer 31* as shown in dotted lines. An 'on' or 'off' indicator is included in the circuit as before. In Fig. III. the two devices are shown as combined, the indicators moving about a common centre, but separate indicators may be employed.

9229. Ship fittings (*Storm Valves*). The valve casing *a* is formed as a pipe bend provided with flanges as shown. The valve seat *d* is on the inner end of the portion *c*, and is situated in a vertical plane. Pivots *f* are made integral with the valve

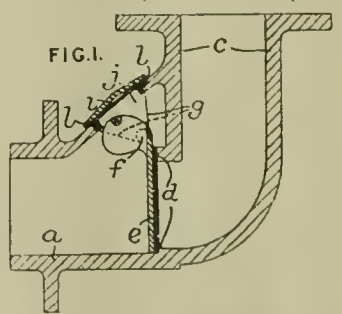


FIG. I.

e and are retained in place by keeps *j* secured in slots by the cover *i*. The two keeps may be connected by bars *l*. A counterweight *g* is provided, and the pivots *f* are situated in advance of the valve *e*, both tending to maintain the valve in its closed position.

The Marine Engineer

And Naval Architect.

LONDON, OCTOBER, 1913.

ACCIDENTS IN SHIPYARDS.

A REPORT on accidents occurring in shipbuilding yards prepared by Mr. H. M. Robinson, Deputy Chief Inspector of Factories and Mr. H. J. Wilson, Inspector of Factories at Glasgow, has recently been made to the Home Office and is now issued as a White Paper. Five years have elapsed since the previous report on the subject was issued to occupiers of shipbuilding yards and to the associations of both employers and workers engaged in the industry. It was pointed out at that time that further enquiry was necessary, and the interim has been occupied in carrying out such enquiry and reporting on same.

It is interesting to note that the recommendations made five years ago have been received agreeably by masters and men. An increased amount of attention has been given to the question of accidents and progress has been made in the adoption of means for their prevention. This advance is largely due to the fact that in many yards, the principals have taken the matter up personally, resulting in a greater amount of supervision being exercised with a view to the prevention of accidents. It is suggested that this activity may be brought about by the desire to keep down insurance premiums, owing to the high compensation rates paid in connection with this industry. The yards in which large passenger steamers are built appear to show greater improvement than yards in which cargo steamers, particularly those of the smaller and cheaper type, form the bulk of the work carried out. This is, no doubt, due to the keen cutting of prices and the rapidity of construction necessary to ensure a reasonable return on capital sunk; consequently it is difficult to obtain voluntarily the adoption of measures which are likely to increase the cost of production. The direction of improvement, however, is marked by a better supply of planks and thwarts for stages and an increased width of same, by ventilators and other openings in the decks receiving more attention, and an increase of covers for such openings, and by a greater supervision over the safety of the workers generally. There are, however, points in some yards which are far from satisfactory, among which may be mentioned the erection and supervision of staging by competent persons employed by the firm. Even where such are employed they appear to have little authority to interfere with workmen using a defective or unsafe stage. For instance, ladders used for giving access to working parts are found with broken rungs or are insecurely fixed; main gangways are erected with single rails in some cases, the rail being on one side only; loose articles are left lying about in the upper stages to the danger of those passing or working below, and access to intermediate and lower decks is capable of considerable improvement.

During the year 1912, in the Belfast, Clyde, Tyne and Wear districts, 1,510 accidents were due to falls, of which sixty-two were fatal, and 1,415 were due to articles falling on persons, of which fifteen were fatal. In the case of those accidents in which the person fell, 86% occurred during daylight and 14% between sunset and sunrise. The inspectors are of opinion that it is undesirable to leave the original recommendations to be carried out by voluntary effort alone, and have therefore put forward a code of draft regulations including certain modifications on the original recommendations, which increased experience and enquiry have shown to be desirable. As staging for a vessel under construction must of necessity be of a temporary character and the conditions constantly changing, it is undesirable to fix any definite number of planks, but some of the regulations are drafted in more comprehensive terms than the original recommendations. The fencing of gangways, in an adequate manner, has received special attention. There is no necessity to include the close boarding of stages in the regulations, as it is comparatively rare for squads of men to work immediately above each other on the side of the ship; consequently this matter, and also the covering of winches are left as formerly. In view of the fact that chains are now seldom used and serious accidents to lifting tackle are now small in number, this is a matter that can best be dealt with separately on a general business as relating equally to other industries. It has been customary in many yards to provide goggles to riveters, caulkers and chippers as they are more liable than other workmen to accidents to the eyes. However, there is a considerable diversity of opinion as to their use, in fact, many workmen refuse to wear them as they consider they tend to obscure the vision, particularly in warm and damp weather, thus rendering the work more dangerous. The inspectors agree with this to a certain extent, and as the accidents to eyes do not exceed 3% of the total accidents, goggles should not be made compulsory, although employers should be encouraged to supply them. The lighting of a ship under construction is a matter of great importance, and while, for the purpose of expedition and good work, adequate lighting is absolutely necessary and is provided, the lighting of approaches is often neglected. This subject assumes greater importance as the ship is nearing completion, owing to the large number of men who are unfamiliar with the ship and have to start work there, such, for example, as plumbers, fitters and electricians, and a regulation has been drafted on this matter. While the new regulations put increased duties on the employers, the success in carrying them out must of necessity depend largely on the co-operation of the workers, if greater safety is to be obtained. Therefore, four regulations have been included, placing a corresponding obligation on the workers. Under these no person employed shall use any plant which does not comply with the regulations, and any person who becomes aware of any defect in the plant which he is using or is required to use, shall report such to his employer or his representative: no person employed shall leave any loose articles or materials lying about in any place from which they may fall on persons working or passing, and lastly, no person employed shall throw down tools, planks, or loose materials from stages, decks and other parts of the vessel, but shall use suitable apparatus for safely lowering such

articles from a height. Time will show how far these particular regulations will be carried out by the workmen; they appear to be such obvious duties, that at first sight the matter appears to be quite easy to comply with, but on consideration, it will be recognised that they are at the root of much that the workmen have done and been accustomed to do in the past, and for any accident in connection with which the employer has been seriously penalized. It is not easy to get out of old habits or to break down customs that have been in practice so long and become ingrained, but it is clearly up to the workman to do his best to comply with the rules on his side, having regard to the increased responsibility put on the employers' shoulders for the workman's safety. The question of the employment of young boys on ships under construction and repair received considerable attention, as it is as important as it is difficult. Accidents to persons under sixteen are very common in that class, due largely to inexperience and indiscretion, particularly as such persons are employed mostly in the earlier stages of construction when the danger is considerable. The prohibition or restriction of employment is always a difficult matter, and the feeling in the trade, particularly on the part of the workmen, is distinctly against any restriction, and in view of the comparatively small number of boys under sixteen employed, the inspectors, although with considerable hesitation, have refrained from recommending a rule prohibiting the employment in the meantime of those under sixteen, and they have only done so as they think that if the present regulations are fully observed by both employers and workmen, and greater care and supervision is exercised, the risk of accident will be appreciably diminished. If this is not so, they are of opinion that the employment of those under sixteen on a vessel under construction and repairs will have to be entirely prohibited. The inspectors properly emphasize the desirability of suitable appliances being provided for the treatment of injured persons in shipyards, and record the fact that some of the larger firms have fitted up excellent ambulance arrangements, where injured workmen can be properly examined and receive first aid treatment under most favourable conditions before being removed, and further, in some cases, special apparatus is provided for lifting out injured persons who have met with accidents in awkward or inaccessible places. Having regard to these facts and to the encouragement given by many firms to their workmen in ambulance training, only the general regulation that suitable means for removing injured persons from the place of accident shall be provided, and suitable arrangements shall be made for first aid, has been included in the report. Whatever benefits will be derived from the regulations, and the more the better for both master and men, the nett result on the cost of production must be to increase it, but the manufacturer is getting used to this common result as the outcome of official regulations.

Messrs. Douglas & Adair, consulting engineers, naval architects and marine surveyors of London and Marseilles, have opened additional offices under the following titles—Messrs. Douglas & Macleod 50, Wellington Street, Glasgow, and Messrs. Douglas & Karris, 1, Appelon Street, Athens.

CORNISH WRECK.

The *Tripolitania*, referred to in our last issue, has unfortunately not been floated off the bank, but, owing to heavy seas, the work expended on salvage operations has almost been in vain, in that the sand has been thrown up around the vessel and embedded the lower part of the hull, filling up to a large extent the canal dug out with the object of floating her off. The *J. Duncan* another vessel which went ashore about the end of July has become a wreck and is being stripped of what is worth saving by the Salvage Association.

HOME INDUSTRIES.

The cultivation of home industries deserves every encouragement, from those who have the interests of their nation at heart, and in many of the counties or districts, the Societies formed for the purpose of fostering the particular industries which appeal to the local inhabitants, are doing good work, and deserve the thanks of the community. By fostering industrial work done by hand, the art is preserved to the country, enriched and beautified.

The Marquis of Anglesey kindly lent his grounds at his seat, Plas Newydd, to the local society, on August 27th, when an exhibition of Anglesey industries and sale of work was opened by the Marchioness. There was a good attendance and the stall holders cleared off a large amount of goods of various kinds. The weather was fine, so that the visitors had a pleasant outing amid the delightful surroundings. Welsh airs were played by the boys' band from the training ship *Clio*, which is anchored off Bangor in the Menai Strait. A lady harpist played an accompaniment to a gentleman who sang in praise of the Society, its aims and the function of the day; a Welsh choir sang sweetly at intervals. Plas Newydd is situated on the Menai Strait above the Suspension and Tubular Bridges, a short distance from the Marquis of Anglesey monument, a conspicuous memorial, while near to it on the edge of the Strait is a monument to Nelson. The village of Llanfairpwllgwyngyllgogerychwyrndrobwll-llandisiliogogogoch is adjacent to the grounds, and is notable for its length of name.

"TITANIC" ENGINEERS' MEMORIAL.

THE amounts to the credit of this fund are as follows.

Institute of Marine Engineers, London, to date	£2,866	10	0
Southampton Committee (fund is now closed). Amount collected	1,082	0	0
This fund has been augmented by a sum of £300 from the Institute of Marine Engineers.			
Liverpool Committee (for the erection of a monument in Liverpool), to date	5,300	0	0
Total	£9,848	10	0

In connection with the fund raised by The Institute of Marine Engineers, the Committee have been in communication with the Directors of Orphanages in order to come to an understanding of the best possible arrangement to make for the utilization of the fund. It is proposed to invest the money contributed to the memorial in a trustee security and make use of the interest to assist cases where help is required in connection with widows and orphans of the members of the marine engineering staff. It is anticipated that the interest thus made available will be supplemented year by year by donations towards what will constitute a benevolent fund inaugurated to commemorate—amid the softening influences inspired by helping others—those it is desired to honour for their attention to duty under trying circumstances.

Messrs. Flannery, Baggallay & Johnson, Ltd., consulting engineers, of London, Liverpool and Rotterdam, announce that Mr. Harold Fortescue Flannery, B.A., son of their senior, has joined their private company as one of the directors and managers.

THE STORY OF THE LEYLAND LINE.

THE details of the history of Frederick Leyland and Company Limited—to give the business its official title—involves notice of many points of considerable interest, not only in the history of Liverpool shipping, but also in the whole question of the North Atlantic steam trade. The inception of the line dates from the fifties of the last century—when Mr. Bibby, the then head of that well-known Liverpool shipping family—started a line of steamships for the Mediterranean trade and went to Belfast for his fleet. The yard to which he gave his custom was then one of small importance, not employing more than 200 men, its style being Robert Hickson & Company. But in the year 1858 the management was assumed by a young man, the son of a medical practitioner at Scarborough, who had been educated in the yard of Messrs. Robert Stephenson & Sons of Newcastle, subsequently acting as draughtsman with Messrs. J. & G. Thomson, of Clyde Bank. This young man was Mr. Harland, subsequently Sir Edward Harland, and founder of the great shipbuilding firm of Harland & Wolff. A year after he became principal of the Belfast yard, Mr. Harland launched the steamship *Venetian* for the old Bibby Line. Some particulars of this vessel may be of interest, for her design has left an indelible mark on the development of the ocean steamship of subsequent years. She was of dimensions as follows:—Length 270 feet 5 inches; beam, 33 feet 7 inches; depth of hold, 22 feet 8 inches. Her tonnage was nett 1,025 and gross 1,508. She had five bulkheads and was rigged as a barque. At that time, and for many years later, Messrs. Harland did not build engines—it was the custom for shipbuilding and engineering to be kept in most cases quite distinct undertakings—and the *Venetian's* machinery was constructed at Greenock by Messrs. McNab and Co. It consisted of a pair of single-expansion engines of the inverted direct-acting type, the horse power being 225 nominal. This Line went on developing its trade to the ports of the Peninsula and the Mediterranean, and adding new ships to its fleet, mostly from the Belfast yard. The type of ship adopted under Mr. Harland's guidance was long in relation to its beam, and was fitted with four masts barque rigged. These ships were successful in every way, and thus it came about when towards the close of the sixties the late Mr. T. H. Ismay made up his mind that the time was ripe for the institution of a new mail and passenger Line of the highest class from Liverpool to New York, he decided that he could not do better than go to Messrs. Harland & Wolff and accept the suggestion of the head of that firm, that the vessels of the White Star Line should be based as to general design, on the model which had proved its advantages in the Bibby Line ships. Towards the capital of this White Star Company the Bibby family made substantial subscriptions, and shortly after the pioneer ship of the new Line sailed, Mr. Bibby himself gave up the active work of shipowning, the management of his Company passing into the hands of his lieutenant, Mr. Frederick R. Leyland who renamed it after himself. He had not been long in supreme control when he made an important new departure, instituting in the year 1876 a new North Atlantic service between Liverpool and Boston. To it were allotted the six largest vessels of the fleet, previously used in the Mediterranean service. These included two sets of sister ships. The *Bavarian*, *Bulgarian* and *Bohemian* of 3,052 tons gross and 1,982 tons nett register. Their dimensions were no less than 400 feet in length by 37 feet 2 inches beam and 28 feet 4 inches depth of hold. They had compound engines of 350 n.h.p., with cylinders 48 and 86 inches in diameter by 51 inches stroke, and were designed for a steam pressure of 65 lbs. The hulls were, of course, built by Messrs. Harland & Wolff, whilst Messrs. J. Jack and Company supplied the machinery from their works at Liverpool. These vessels were launched in the years 1869 and 1870, and their importance at that date may be gauged by the fact that the first *Oceanic* was only 20 feet longer than they, though her beam was 40 feet 9 inches, whilst the *Russia*, launched in 1867, but still in 1869 the favourite Cunarder, was only 358 feet long by 43 feet wide. The three other sisters thus put into the Boston trade dated from the year 1867 and were the *Illyrian*, *Istrian* and *Iberian*. They were about ten feet shorter than the *Bavarian* class, and of 2890 tons gross register. They had simple engines of the direct-acting type, but really did not differ materially from the later vessels, and helped to make a well balanced service enough. It can well be understood that at the date the Boston service was commenced these vessels were somewhat too large for their original employment and much more suited for the North Atlantic trade, where they were really in the front rank in size and importance. Such encouragement did they get in their new activity that in 1881 Messrs. Leyland provided two still larger vessels for the service. They were the *Venetian* and the *Virginian* of 4,081 tons gross register. They were 22 ft. longer than the "Bavarian" class with a beam of 40 feet and had engines of 600 n.h.p. This pair of sisters came from the Jarrow yard of Messrs. Palmer's. In 1888 the Company went back to Messrs. Harland and Wolff for a still larger vessel, the *Bostonian*. She was about 4,670 tons gross register and though only a few inches longer than the Jarrow-built ships she had a beam of over 43 feet. Two years more passed and the *Georgian* and the *Columbian* came out for the Boston line. They were of over 5,000 tons, being 442 feet 6 inches in length and of 45 feet 2 inches beam.

In 1891 the *Lancastrian* and *Philadelphian* were added to the fleet, these being vessels of 5,120 tons gross register. Then the following year the Company was registered under the limited liability acts with a capital of £450,000 and debentures to the amount of £350,000 were issued. The tonnage of the fleet at this time amounted to about 60,500, so that it stood in the Company's books at something under eight pounds a ton.

Another development took place in the year 1896, when a combination of three great shipping interests was formed under the style of the Wilson and Furness-Leyland line. This combination was to control the London and New York service of the Wilson line and the Boston services heretofore conducted between the Thames and Boston by the Furness-Withy and Leyland Companies. They then proceeded to assign certain vessels from each of the component fleets to the service of the new organisation and at the same time to place orders for new vessels for the work. These latter were named after distinguished royal ladies and were built, some on the Clyde and some at Messrs. Harland & Wolff's. They were fine vessels of nearly seven thousand tons apiece, and were got to work early in the year 1898. Their design was especially for the New York branch of the joint service. For the Boston trade came the Leyland *Georgian* and *Bostonian*, the Wilson *Idaho*, the *Cambrian* of the Furness Line and the *Megantic*, the last named trio being quite new vessels. A new development, however, very soon followed. It was by agreement with the Atlantic Transport Company, and its effect was that the competition between the two lines in the New York trade should cease, the Wilson and Furness-Leyland line abandoning that trade and confining its attention to the Boston work, and the fleet of new vessels just built to carry it on, being taken over by the Transport Company, who at once changed their names to bring them into harmony with those of its existing fleet. In 1899 came the South African War and many vessels from the Mersey found lucrative occupation in the steamship and transport services. Amongst them was the Leyland Company, and also the West India and Pacific Steam Navigation Company, another Liverpool Line. The latter had been established in the year 1863 to take over and develop the work of a private shipowner. It traded with passengers and mails to the West Indian Islands and to the Isthmus of Panama, as well as to Mexico and the cotton port of New Orleans. It was said that on one occasion at least its service to Colon beat that of the Royal Mail Company. Anyhow by the time the war commenced it had a fine fleet of some twenty vessels most of them built either by Messrs. Harland & Wolff, the Barrow Shipbuilding Company or on the Clyde. The *European* and *American*, for example, were Queen's Island built vessels of over 8,100 tons each, fitted with twin screws. The *Atlantian* and *Indian* were of the same type, but even larger, and were advantageously engaged in the Government service. To this Company the Leyland Line made overtures and eventually a new business was constituted under the style of Frederick Leyland and Company (1900) Limited to take over the two older Companies, the West India fleet being entirely absorbed by the other line and its shareholders receiving some £63 for every £20 share of their holdings. At this time it may be mentioned there were negotiations afoot to bring in the Atlantic Transport Company also, but these were not carried

to a successful conclusion. One of the elements in the deal seems to have been the through bill of lading system whereby the Leyland Line obtained the co-operation of certain American Railroads and was thus able to offer facilities for through shipment from inland cities in the United States over the rails of these Companies and across the Atlantic by the ships of the line. Its capital was now increased to £2,800,000 in £10 shares, of which 150,000 were preference. Its chairman was Mr., now Sir J. R. Ellerman. This gentleman had been chairman since 1893 when the first Company was formed and he was largely responsible for the successful carrying through of the amalgamation. A little later came another and far larger combination, that of the Morgan Combine, into which the Leyland Company entered in so far that, though it continued its separate entity, so large a block of its shares were taken over that the eventual control was obtained by the International Mercantile Marine Company of New Jersey, U.S.A. The story of the organization of the great Combine must be reserved for articles on lines other than the Leyland. Suffice it to say here that Sir John Ellerman at this juncture severed his connection with the Leyland Line and taking with him, as nucleus of a new fleet, those vessels of the Company which were engaged in the Mediterranean, Portuguese, Montreal and Antwerp trades, and the businesses connected therewith, laid the foundation of the present Ellerman line. The Leyland Company, which had acquired 97,000 tons of shipping from the West India and Pacific Company, also obtained control of 99 per cent of the capital of the Wilson and Furness-Leyland Line and during the first year of its reorganization added nearly a million pounds worth of new tonnage to its fleet. On its first year's working it was enabled to write off depreciation, pay debenture interest and preference dividend, carry £370,000 to the formation of a reserve fund and pay a dividend of five per cent. on its ordinary shares. No doubt good management had much to do with this profitable state of things, but at the same time it must not be forgotten that a great deal of its tonnage was still in lucrative Government employment, and to afford occupation for all this tonnage the Company opened up fresh trades including a season line between London and Quebec, and a more permanent service between the Thames and New Orleans. At the end of the year 1900, including vessels under construction, the tonnage of the fleet totalled 321,000 tons gross register. Mr. Wilding was now chairman of the Company, but in September 1906 he was succeeded by Mr. H. B. Roper, and Lord Pirrie—who is so closely connected with the preponderating interest in the affairs of the Company—was also a director. In 1908 it became possible to restore the original title of the Company by dropping the distinguishing "(1900)" which had formed part of the designation for some eight years. During this period there had been considerable changes in the characteristics of the North Atlantic trade, and the fine steamship *Hanoverian*, of just under 12,000 tons gross register, built in 1902 at Belfast by Messrs. Harland & Wolff, was transferred to other branches of the Combine. So, too, two still larger vessels of about 18,000 tons apiece, launched from the same yard in 1907, were transferred to another company before completion. Of late the Company has been engaged in disposing of many of its older steamships—one Wilson and Furness-Leyland liner and five old West India and Pacific liners having recently been cast from the fleet whilst a good amount of tonnage is being added. The new ships are of a handy size, being generally of from 4,000 to 6,000 tons gross register though there is one of over 9,000 tons under contract to be delivered during 1914.

There are five passenger services maintained by the Leyland Line, on all of them cabin passengers only are carried and here, as in other lines where the same principle is applied, the travelling public seem to appreciate the advantages of the system, as the accommodation is naturally roomy and comfortable and the fares are low, whilst, as we have seen, the ships are of good size and excellent sea boats. The lines on which passengers are carried are that from Liverpool to Boston; that to New Orleans, which has, as its ports of departure, London, Liverpool and Antwerp: and three lines from Liverpool to Gulf and West India ports, *viz.*, that to Jamaica, Mexico and Tampico and ports; that to St. Thomas, Columbia and the Isthmus of Panama, and that to Barbadoes, Trinidad, Curacoa and intermediate places.

For some years the Company has had bad times and the preference dividend fell into arrear. In 1912, however, the gross profit amounted to no less than £667,000, and thereby the directors were enabled to carry specially heavy sums to depreciation including nearly £134,000 written off the book value of the Wilson and Furness-Leyland fleet, and to pay a substantial amount on account of the arrears of the preference dividend. At the end of the year 1912 the fleet consisted of 45 vessels of 275,300 tons and under construction an additional 52,275 tons in nine bottoms. The new tonnage which has been added of recent years had, of course, placed the Company in a position favourable for making the most of the good times which the shipping world has recently experienced. In conclusion it may be pointed out that the Leyland line is hardly an organization such as those Companies recently treated, which have a peculiarly passenger interest, but at the same time, owing to the absorptions and re-arrangements to which it has been a party, it is necessary to give its history a place early in the series which we are now laying before our readers.

THE SPERRY GYRO COMPASS.*

THE increasing use of steel in shipbuilding has made it necessary to develop a compass which is not dependent upon magnetism. A rotating body suspended with freedom about two axes will, when subjected to an angular motion, tend to place itself so that its plane of rotation is coincident with the plane of the motion to which it is subjected. In the Sperry gyro-compass this phenomenon is utilized in such a manner that the rotating wheel of the compass places and keeps in the plane of the earth's rotation, while at the same time remaining unaffected by the movement of the ship. The gyro-compass must be so suspended that there is almost an entire absence of friction about the vertical axis. In the Sperry gyro-compass this is accomplished by suspending the gyroscopic or sensitive element from a stranded steel wire, the top of which is held in a frame surrounding the sensitive element, and made to follow it by a system of electrical contacts controlling a motor which drives the frame. This surrounding frame is used as a base, from which forces are impressed on the gyroscopic element to suppress its freedom and cause it to maintain its position in the north and south meridian. The method of suspension of the gyroscopic element, although perfectly sensitive about the vertical axis, permits of the use of a very heavy wheel, so that a large directive force is obtained. Any gyro-compass must have a certain natural error, depending upon three variables—*i.e.*, the speed, course and latitude of the ship on which it is used. An automatic device attached to this gyro-compass constantly corrects the card of the compass against these errors. The system comprises a master compass, which is placed in a well-protected position in the ship, and repeater or auxiliary compasses, the dials of which are controlled electrically from the master compass. The method of design used in this gyro-compass has made possible a simple and substantial instrument, which at the same time is extremely accurate.

* Read at the Birmingham meetings, Sept., 1913, of the British Association for the advancement of Science, by Lt. R. E. Gillmor.

Engineering Standards Committee.—Standard Screwing for Marine Boiler Stays.—The Sectional Committee on Sections and Tests for Material used in the construction of ships and their machinery having had under consideration certain proposals with regard to the screwing of marine boiler stays, which were submitted by the Consultative Committee of Shipbuilders and Engineers appointed to confer with the Marine Department of the Board of Trade, have made the following recommendations:—(i.) That the Whitworth form of thread be used; (ii.) That nine threads per inch be used for all screwed stays above 1¾ ins. diameter; (iii.) That six threads per in. be used for longitudinal stays above 2 in. diameter, having nuts on both sides of the plate. This report has been approved by the Main Committee.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Allan Line.

SOME three or four months ago rumours were in circulation to the effect that the Allan Line was about to make over its interest in the River Plate trade to the Donaldson Line of Glasgow. The rumours died away at the time. Now they have not only revived, but have become official intimations. The fact of the matter seems to be that the South American trade is now so highly competitive that it must either be left alone altogether or receive an enormous amount of careful attention from the shipowner, who must further be prepared to sink a good deal of capital in the fleet which he provides for it. The Allan Line sprang from Canada, and has always had its main associations with the Dominion. Moreover, there is quite a large enough field in the Canadian trade to occupy any activities, however great, and so the managers of the Allan Line have definitely decided to concentrate their efforts on the Canadian business. The first step in this direction has been the retirement from the South American trade. Others are not unlikely to follow. The near advent of the quadruple-screw steamships *Alsatian* and *Calgarian* to their station has enabled the Company to part with two steamers from the fleet. These are the *Hungarian* and the *Hibernian*, sister ships constructed in the year 1902 by Messrs. Napier & Miller, of Glasgow. Each vessel is of some 4,500 tons gross register. They were built for the Norfolk and North American Steamship Co., of Liverpool, but were taken over by the Allan Line in 1903 and renamed to suit the nomenclature of the new owners' fleet. They have now been transferred to the Chargeurs Réunis of Havre and again renamed. Their new appellations—as is usual with the larger class of ships in the Havre Company's services—commemorate famous Admirals of the French fleet.

Meanwhile the Allan Company and the Canadian Pacific Railway are ever moving towards closer working. Already a single victualling department supplies the needs of the various steamships of the two Companies at Liverpool. It is rumoured that the ships will also be under the supervision of a single marine superintendent. Then at the beginning of September we had the important announcement that—Mr. Arthur Piers having to retire on account of ill-health from his position as manager of the ocean steamships of the Canadian Pacific Railway—that appointment has been given to Major Maitland Kersey, D.S.O. The significance of this event is realized when we remember that the Major is already a director of the Allan Companies. Major Kersey is a man who began his association with the Canadian Pacific steamship business many years ago. For in the later eighties he was manager of those vessels of the fleet which had their headquarters at Vancouver. Then when it was determined to build the three "Empresses" for the Vancouver-Japan-China trade, he was sent over to Barrow to superintend their construction. His visit to England led to his appointment by the late Mr. T. H. Ismay as representative at New York of the White Star Line. This in itself was a hall mark of ability and success. For Mr. Ismay, had above all men, the faculty of choosing the best subordinates and the New York position, which had previously been held by Mr. Bruce Ismay, was, of course, one calling for a capable officer. After holding this position for some years Major Kersey retired in order to follow a less prosaic adventure in the North-west and went out to Yukon where he had some extraordinary experiences, and, it is rumoured, made some fortunate discoveries. Then he came to London where he was, of course, in touch with financial magnates through his former connection with Messrs. Ismay, Imrie & Co., who by this time were managing the Atlantic Combine for Mr. Morgan and his associates. He resumed his connection with shipping by taking the directorship of the Allan Companies and entered finance by becoming London manager for the famous American banking house of Messrs. Brown, Shipley & Co. That this powerful personality has again entered the service of the Canadian Pacific Railway is not only interesting in itself, but is important as showing how the interworking of the two great Canadian Shipping Companies is constantly progressing.

The Relative Sizes of Warships and Liners.

In a recent issue of a contemporary appeared a thoughtful review of a book by a London Member of Parliament who has achieved a reputation for naval knowledge. The author had stated that battleships "are small in comparison with liners." This, the reviewer says, "is barely true," and adds that "the displacement of the latest "Dreadnought" is very nearly that of the *Lusitania*, which latter is incorrectly given (by the Member of Parliament) as 75,000 tons. Both reviewer and author are, of course, quite wrong. The figure 75,000 in the book might have been approximately the *Lusitania's* horsepower, but could have no relation to her tonnage. Her gross register is 31,550 tons. This is no doubt not essentially much greater than the figure 27,500 tons which is found in the books of reference as the tonnage of the latest "Dreadnought," the battle-cruiser *Queen Mary*. But the reviewer has failed to appreciate that this 27,500 tons of the warship is *displacement* tonnage, which is by no means comparable with the gross register of the *Lusitania*. The true figure is the *Lusitania's* displacement. That at 33 ft. 6 in. draught is no less than 38,000 tons, so that in truth and in fact the *Queen Mary* is not three-quarters the bulk of the Cunarder. But even then we have not done with the unfairness of the comparison. For the *Queen Mary* represents the practice of the present day—she was only commissioned in September, 1913. The active career of the *Lusitania* dates from the year 1907. Thus we could either take as our representative of the warship one of the earlier "Dreadnoughts," whose displacement would be, say, 19,000 tons (just half that of the *Lusitania*), or choose a merchantman such as the *Olympic*, whose displacement, being some 60,000 tons, would again be more than double the 27,500 tons of the *Queen Mary*.

The Call at Queenstown.

The Cunard Company has carried into action its intentions in regard to the call at Queenstown in spite of the protests which have been, and indeed are still occasionally being, made by the Irish. No passengers for the *Lusitania* or *Mauretania* are now embarked at Queenstown, the ships calling off the port for mails only, it being further understood that if the weather were bad it might be impossible for shipment to be made, in which case the liner would proceed without any mail matter but that which had been put aboard her at Liverpool. Meanwhile the Tuesday service of the Company has been made a weekly one, four ships being appointed to maintain it. These are the *Carmania*, *Caronia*, *Franconia* and *Laconia*. The two first-named make the port of New York as heretofore their objective, whilst the *Laconia* and *Franconia* sail, as they have usually done, in the Boston service for which they were primarily designed. Thus in this secondary service the sailings to New York alternate with those to Boston, and thus there is afforded a weekly departure by first-class steamer to one or other of the two ports, and all these vessels call at Queenstown and take passengers for that port.

The Annual Report of the Mersey Docks and Harbour Board

gives certain interesting details as to the work of the engineering department. During the year under review some 15,400 tons of stone have been deposited on the revetment on Taylor's bank, making a total of 269,400 tons deposited since the commencement of the undertaking. The joint operation of the scour caused by the revetment and the activities of the Dock Board's dredgers—which between them shifted some 3,682,400 tons of sand from the neighbourhood of the Askew spit—have resulted in the widening of the channel to the extent of some 300 ft., and accordingly the buoys have been moved that distance to the southward. Encouraged by the success of this work the Board is now busy with a new training bank off Dingle point—between Liverpool and Garston, and the cutting away of the rock at the Point is about to be commenced. But the dredging at the bar and from the Queen's and Crosby channels is the job which involves the consideration of really big figures (some 16½ million tons having been removed during the year). Since the commencement some twenty years ago of the dredging to render the port accessible throughout every state of the tide, a total of some 204 millions of tons of sand have been removed. When one appreciates that the Board has one dredger which can raise 10,000 tons of sand in an hour or two, one does not feel quite so astonished as one otherwise would be at the statement that there are shovels on the Panama Canal works which can deal with 10,000 tons of "dirt" in the course of a day's work.

The "Imperator."

A good deal of discussion has recently taken place in the Press in regard to this vessel, there being circulated statements to the effect that the vessel would be off her station for a considerable period, as large alterations were required in her passenger and boiler departments. An emphatic denial has been given to these rumours. The fact seems to be that the management have come to the conclusion that they can add to the earning power of the ship by making a substantial increase to her refrigerating installation. But they assert that neither in her boiler department nor in her passenger accommodation will any changes be made, whilst the period during which she will be withdrawn from service will only be that which is necessary for the ship's annual overhaul.

The Panama Canal.

An interesting account of the natural and geological causes of the land slides and of the uprisings of the bed of the waterway, which have troubled the engineers from time to time, was afforded in one of the papers which was read at the recent meeting of the British Association. But in spite of all recent difficulties the engineers at Panama are still determined that the dates they have put forward shall be kept. On the last day of August the final barrier between the Pacific Ocean and the new waterway was blown up by the discharge of some 44,800 lbs. of dynamite. The day following this explosion, dredgers set to work at the Atlantic end to remove the last obstacle to the entry of the sea into the cut. As regards the Culebra cut it is announced that the dyke at Gamboa is to be blown up on the 10th October. This will mean the admission of water to the cut which carries the highest reach of the Canal. Indeed, Colonel Goethals stated in a speech at New York the other day that before the end of October vessels would be able to pass through the Canal. Such vessels as can be admitted at present, however, must necessarily be of small tonnage and the commercial opening to vessels of larger dimensions will not take place before January, 1915.

Another Great Feat

of American engineers has just reached a successful termination. The Ambrose Channel works, which have occupied some twelve years, are now finished. When the Cunard steamship *Lusitania* came out the work was sufficiently advanced to allow her to use the new channel, but it was then far from equal to the ideal which its makers had set before them. Being now complete it affords a channel of no less than 2,000 ft. wide and of fully 40 ft. deep at low tides over a course of seven miles. The port of New York is thus at all times accessible to the largest ships yet even contemplated, for whilst there is now plenty of water a great deal of attention is paid to the lighting and buoyage of the cut and there is no difficulty in navigation at night.

Hamburg-American Company.

The differences between this line and the Nord Deutscher Lloyd do not seem to be in the way of adjustment at present. The two great organizations are starting new services to tap one another's preserves, whilst with a view to further hostilities the Hamburg line has announced its intention of retiring from the Siberian Conference. Meanwhile the Hamburg line has had the keel of its third "Imperator" laid at Hamburg, and the Lloyd has ordered a sister to the 38,000 ton *Columbus* from the Schichau yard at Ebling.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondents.)

Portsmouth Dockyard.

JUST a year ago, we were looking forward to the launch of the *Iron Duke*, which took place on Saturday, October 11th, and now it is the *Queen Elizabeth* which is nearly ready to be put into the water. Until September 20th it was not known who would perform the naming ceremony, but it was then officially announced that she would be launched on October 16th, and that Lady Meux would act as her sponsor. It seems to be quite a settled plan now that only one ship shall be put off the stocks here annually, although at the other yards two vessels at least is becoming the rule. It is regarded as possible that steps may be taken to build another slipway in the dockyard, or to enlarge one of the old ones which is now used for another purpose. So much has been done lately to improve the general facilities of the yard for dealing with refits and repairs that it is considered possible that the next move may be to increase the building accommodation. It is but a short time ago that the *Queen Mary*, which came up harbour on September 1st and was promptly put into the new lock, could not have been docked here. The big battle cruiser is 680 ft. long and has a beam of 88 ft., so that neither No. 14 nor No. 15 dock could take her. The former is 559 ft. long, with a width entrance of 82 ft., and the latter 578 ft. long, with a width of 94 ft. But the new lock is 850 ft. long, and has a width at the entrance of 110 ft. The additional lock is likely to be of still bigger dimensions, and the floating dock has a length of 700 ft. With these five docks, Portsmouth will be well provided, but another building slip is also a desideratum. In the matter of modern equipment, Portsmouth is also well off; a floating crane has just been received, and in some respects resembles the sheer hulk for masting ships which used to be a feature of the harbour. The crane when completed will be able to move about the harbour under its own steam, and will have a lifting power up to 150 tons. It should be of great assistance in moving weights from and to those ships which it is not desired to bring alongside the yard. The *Queen Mary* was put out of the lock again on the 7th, and had her crew completed to full strength on the 15th. As soon as the *Queen Elizabeth* is put afloat, work is to begin on the new ship, for which quantities of material have already been delivered. The *Iron Duke* is well advanced, and she should be ready for trials at an early date. The *King George V.* and *Britannia* are undergoing repair, and the *Neptune* has arrived for a partial refit. The *Kent*, *Patrol* and *Pathfinder*, with some smaller vessels, are also in hand, and the last-named vessel is to be ready shortly to take the crew of the *Amethyst* to join the Eighth Destroyer Flotilla. The *Cochrane* and *Achilles* arrived at Spithead to give leave, and the *Ant*, a vessel which has been built for the conveyance of liberty men from the ships at Spithead, has been delivered by the contractors.

Chatham Dockyard.

It was mentioned last month in these notes that there was a possibility of two light cruisers being built at this yard this year, instead of one only, as arranged for in the Estimates. The rumour has now been officially confirmed, and has given much satisfaction, as it means not only more work, but an intention of developing the resources of the yard to the fullest extent. The decision, indeed, indicates very clearly the appreciation by the authorities of the capabilities of the yard for the work of construction. Ships can be built quite as cheaply and expeditiously in the public as in the private yards, and with an additional assurance of prompt delivery, which experience has shown to be uncertain in the case of contract-built ships, especially when there is a boom in merchant shipbuilding. It is understood that the Estimates ship will be built on the slipway from which the *Lowestoft* was launched, and that the new ship will be constructed in the dry dock when the *Arethusa* is floated out next month. It is generally felt here that there is no reason why we should not always have two ships building as well as the submarines. The *Lowestoft*, which was laid down in July, 1912, and launched on April 23rd last, is making good progress, and her sister the *Chatham* has left for service in the Mediterranean. The *Amethyst*, after a refit, left on the 9th to resume her duties as depot ship to a destroyer flotilla, and the *Highflyer*, which has been preparing here for service as a training vessel, was commissioned with the crew of the *Sapphire* at the end of last month and left for Devonport. There is plenty of work in the yard at present. The *Dominion* arrived on September 13th for docking, the *Cressy* is also here for refit, and the *Hogue*, *Leviathan* and *Diamond* are in hand. Of small craft, there are about the usual number. The *Ness* and the *Nith* left on the 9th, but the *Rattlesnake* and *Savage* have come in for refit, and the *Pincher* and *Scourge* for docking. The *Intrepid* and *Iphigenia*, minelayers, are expected to arrive for refit on October 1st. The *Perseus*, from the East Indies Station, paid off into the Material Reserve on September 19th. Instead of Captain Harry Jones, who was at first appointed to the post, Captain E. H. Grafton has been

selected as Captain of the Dockyard, Deputy Superintendent and King's Harbourmaster. Captain Grafton commanded the *Endymion* when she was the gunnery training ship at the Nore. He also commanded the *Hibernia* when that vessel was specially prepared with an aeroplane slipway for the King's visit to Weymouth. More recently he has been in command of the *London*, in the Fifth Battle Squadron. The order for the machinery of the additional light cruiser to be built here has been given to the Scotts' Shipbuilding Co., of Greenock. The two new cruisers will be named *Calliope* and *Conquest*.

Devonport Dockyard.

The western yard maintains its position as the premier Government building establishment, for while there are already two vessels, the *Warspite* and *Aurora*, in process of construction, there are indications that before long there will be again three ships in hand. A new battleship is, of course, to take the place of the *Warspite*, and now an additional cruiser will follow the *Aurora*, while the *Ferol* will occupy the slip from which the *Carol* was launched in July. The report was mentioned last month that possibly one of the light cruisers, which it had been originally intended to put out to contract, might be transferred to this yard owing to the congestion in the private establishments. This report has now been officially confirmed, and has given much satisfaction. Overtime is being worked on both the *Warspite* and *Aurora*, manifestly with a view of getting these vessels into the water without delay. No date has been officially fixed for the launching of the battleship, but the cruiser will be put afloat on October 16th. Great quantities of building material are being delivered, and as was said last month, it is conducive to expedition when similar vessels are built at the same yard, since duplicates of castings, etc., can be ordered and used alternatively for either ship, whichever needs them first. The visits of the foreign vessels, both Japanese and Italian, have aroused considerable interest. The *Kongo* especially was visited by a great number of people, and her officers were most hospitable to those who went on board. The usual salutes and calls were exchanged with the Italian vessels, but as these were of older types, they did not possess the same professional attraction as the newer Japanese cruiser. The *Active* and *Amphion* arrived on August 28th to give leave, and on the same day the *Dublin* left for the Mediterranean. The *Dartmouth* recommissioned on September 2nd, and will leave on October 4th to take the place of the *Perseus* in the East Indies. The *Warrior* has also left for a refit at Malta, and on September 6th, the *Defence*, after recommissioning, left for the Mediterranean. The *Triumph* was also to have left, but has been detained by machinery defects. The *Apollo* is expected on September 25th and the *Ajax* on October 1st. The *Berwick* and *Suffolk* will commission on September 27th with full crews, and with other vessels of Admiral Cradock's squadron are expected to leave for Bermuda before the end of the month. The contract for the machinery of the additional cruiser to be laid down here has been placed with Messrs. Cammell, Laird & Co. This ship is to be called the *Cleopatra*, and the naming ceremony will be performed by Mrs. George Lambert, wife of the Civil Lord. With the departure of the *Royal Oak* and the sale of the *Royal Sovereign*, there are only two ships left in the Material Reserve at this port, the *Andromeda* and the *Pandora*. Very shortly there will be only one, for the *Andromeda* is already in hand for the purpose of being added to the *Powerful* training establishment for boys, when there will be five hulks employed as boys' training ships at this port. The *Highflyer*, which arrived from Sheerness on August 31st, has been prepared as a sea-going training ship attached to the Royal Naval Engineering College at Keyham, and will also be used for the cadets entered direct from the public schools.

Sheerness Dockyard.

The floating dock, which only arrived here on July 10th of last year, and was first tested with the battleship *St. Vincent* in the following September, will, it is understood, be transferred shortly to a northern base, either Cromarty or Rosyth. It is reported, however, that a still larger one will eventually be placed in the Medway, as there is no dock there now capable of taking the latest ships of the dimensions of the *Queen Mary*. It is considered more expedient to have a floating dock nearer Sheerness than to enlarge one of the docks at Chatham. The old *Jumna*, once an Indian trooper, then a floating magazine, and now a coal hulk, is also to go to the north, and has been towed to the Firth of Forth by the *Conqueror*. It is said that the need for a coal depot there was revealed during the manœuvres. The *Indomitable* left Sheerness on August 27th and was joined by the *Invincible* and other ships, which accompanied her to the Mediterranean. The light cruiser *Chatham* left for the same station on August 30th. The *Shannon* and *Natal* arrived on September 6th to give leave, and the *Lord Nelson* and *Agamemnon* have been here for the same purpose. The *Ettrick* left on September 7th after refit, and the *Beagle*, *Bulldog* and *Grasshopper* have come in for overhaul. The *Blonde* was recommissioned on the 9th, and several submarines have come into the dockyard hands. There seems to be some uncertainty about the recent change by which the *Swift* and three of the Tribal boats have been made senior officers' vessels in the destroyer flotillas, instead of light cruisers. In some quarters it is expected that these vessels will carry commanders in command, and that the captains of flotillas will live on board the depot ships, and only join their flagships when the boats are cruising. This seems the more probable as the offices from which the administrative work is carried on, and the administrative staff, are on board the depot ships. The value of the change rests undoubtedly in supplying a faster boat as flagship, since the ex-scouts have not the destroyers' speed by at least two knots. It is expected, however, that the new light cruisers will be more speedy, and in most weathers will be able to overhaul any destroyer. The *Agamemnon* and *Lord Nelson* are not to rejoin the Second Battle Squadron, but will go to Gibraltar with the Fourth, until this squadron can be made up entirely of early "Dreadnoughts," which will happen when all the "Iron Dukes" are ready for service.

Pembroke Dockyard.

There is yet much doubt expressed here as to the sequence in which the various ships to be built will be laid down. It was hoped at one time that the two light cruisers allotted to the yard would be on the slips together, but this appears to be uncertain. There are only two slipways here on which these light cruisers can be built, Nos. 1 and 5. The *Trefoil* is now building on slipway 5, and the first light cruiser on slipway 1. If the second light cruiser is not laid down until the first is launched, it is difficult to see how the money allotted to her can be spent, unless cruiser No. 1 is put afloat within six months of her beginning. There has been some trouble about the roof of the shed over the slipway on which the *Turmoil* was to have been laid down, and it is now suggested that, instead of cruiser No. 2, she should follow the *Trefoil*. This last-named ship is already behind the date for going afloat, and like many other vessels at this yard, has been delayed by non-delivery of material. The turbines of the *Nottingham* have arrived since last month's report, and they are now on board, which should permit of this vessel being closed in and completed early for trials. There must be, however, more rapid progress in the work of the yard if it is to come up to schedule. The trials of the *Fearless* have been successful, the power developed being greater than that called for by contract, and her speed was satisfactory. The *Dove*, destroyer, has also made satisfactory trials after refit, and the boats now in hand are the *Thorn* and the *Leopard*. By the arrival of the *Albion* from Sheerness on September 4th, all the ships of this type, with the exception of the *Glory*, which is at Portsmouth, are now in the Haven, and the Eighth Battle Squadron is complete. These ships will not pass out of the effective list until 1916. It is stated that if a suitable situation can be found near Milford, a building is to be put up there for the storage and handling of the supplementary charts which are now at the Admiralty in charge of the Hydrographic Department. It is said that, owing to the fewer warships going foreign, there is a surplus of charts, and that merchant shipping can be supplied as readily from here as anywhere. This appears to be merely a rumour at present, and one of the navigating officers here has suggested that, if true, there must be some other reason for such a step, since the merchant service does not get its supply of charts direct from the Admiralty, but through agents. Staff-Captain J. D. Moulton, who had been King's Harbourmaster since January, 1906, has now been succeeded by Commander C. W. C. Strickland, from the battleship *Mars*. The names of the two light cruisers to be built in the yard are announced as the *Cordelia* and *Carysfort*.

WATERTIGHT BULKHEADS AND THEIR STRENGTH.

THE function of a transverse watertight bulkhead is, of course, to float the vessel in the event of the compartment on either side of the bulkhead being flooded, but incidentally the presence of the bulkhead plays an important part in the strength of the vessel as a whole. The more obvious is the transverse strength which the bulkhead gives by supporting the sides and bottom against the pressure of water, but this is not without its disadvantages, as the presence of the bulkhead leads to a discontinuity in strength, a thing that cannot be too carefully guarded against in a vessel.

To break a piece of flat iron we nick it with a file and then bend it over the sharp edge of a table; in just the same way the plating of a ship tends to break over the sharp edge of the bulkhead, and for the counterpart of the nick we have the extra row of closely-spaced rivets due to the second frame added at a bulkhead, which frame has its rivets spaced closely together for watertight work. To prevent this discontinuity in strength, at least to some extent, it is the practice to fit liners in way of each out-strake of shell plating, which liners extend well in front of (and well behind) the bulkhead, and so double fifty per cent. of the plating.

Transverse bulkheads play an important part in supporting the vessel when she is being docked, a condition of things which calls for great transverse strength. Again, they help the vessel to resist strains due to racking when rolling among waves, this racking having the effect of opening out or shutting in the angle between frame and beam, or frame and double-bottom.

It may well be that the deadness of a ship when she is made too rigid is a source of weakness rather than of strength, as there is then no give as the vessel encounters shock of waves, or when stresses are suddenly applied to her, due to her getting into some uncomfortable position on the waves. It is an interesting fact that a vessel fitted with a bulkhead designed so as to give somewhat in a transverse direction, was a very easy boat when among waves. The "give" in this case was accomplished by breaking the line of the bulkhead plating when it reached the margin plate of the inner bottom, and from that point angling the bulkhead till it met the ship's side a frame space in advance of the main plating of the bulkhead. The spring so obtained gave the excellent result mentioned above. This transverse flexibility, combined with absolute rigidity in the vertical direction, is one of the many advantages of the new Scott Bulkhead, the vertical corrugations of which enable the bulkhead to give sideways. The secondary effect of the transverse bulkhead is to give longitudinal strength to the hull; this it does indirectly by supporting and keeping to their work the keelsons and stringers which either pass through it or, if cut, are well bracketed to the bulkhead. In a more direct way the transverse bulkhead contributes to the longitudinal strength, as it prevents the sides from coming in at the top when the vessel is hogging-crest of wave amidships, or from going out at that part when the vessel is sagging-hollow of wave amidships; the wave considered being of the same length as the vessel. If, by means of the bulkhead, we prevent this secondary effect due to hogging or sagging, we prevent to an extent the primary effect, that of arching the vessel amidships in the case of hogging, or of letting her droop there as in the case of sagging.

Having dealt with the part the bulkhead plays in the structural strength of the vessel as a whole, we now come to the strength of the bulkhead itself.

The possible static pressure which may come on the bulkhead is, in the general case, that due to water which has risen a certain distance above the crown of the compartment, thus giving a pressure head even at the top of the bulkhead. The pressure, of course, varies directly as the depth, giving a wedge-shaped volume of water the weight of which, if the bulkhead be laid in a horizontal position, would give the load on the bulkhead. We have now two problems to face: (1) To find the requisite strength of stiffener to take the whole load on the bulkhead, the plating as usually fitted not being deemed rigid enough to do more than prevent the water from passing between the stiffeners. (2) To find the strength required by the plating in order to fulfill the above requirements. The ends of the stiffeners are usually taken as being "fixed," that is, as being so connected to inner bottom or deck, as the case may be, that the effect is that of a beam whose ends extend well into unyielding masonry. That the bracket connection shown in Fig. 1, together with a certain amount of flexibility in the deck or inner bottom, prevents this assumption being fully realized will be readily seen, and in choosing a working stress for the material, allowance should be made for this discrepancy when fixing on the factor of safety.

There is another debatable point, and that is the length of stiffener which should be taken as stretching between the assumed masonry walls in which its ends are fixed. One extreme is to take the length in between the brackets, which supposes them to prevent any bending whatever of the stiffener till it is clear of the bracket. The other extreme is to assume that the bracket in no way prevents the stiffener from assuming its elastic curve, and only fixes its extreme end, a rather difficult thing to conceive of. It would appear that an assumed length of stiffener lying somewhere between these limits is more correct than either, but where it is difficult to determine.

Enough has been said to show the need of some definite ruling on these matters, based on actual experiment, and it is to be hoped that the Bulkhead Committee now sitting will set these points at rest.

The amount any one stiffener bears of the total load on the bulkhead is a strip of width equal to the spacing of the stiffeners, and for a beam loaded as shown, assuming its ends to be efficiently fixed, and the length of stiffener outside the fixing to be from inner-bottom to deck, the Shearing Force Diagram, Bending Moment Diagram and Elastic Curve are as drawn in Fig. 2. In the Shearing Force Diagram it will be noticed that the shearing force at the bottom is much greater than that at the top, as might have been expected, showing the necessity for a stronger attachment to the inner-bottom than to the deck. From the Bending Moment Diagram it will be seen that the greatest bending moments are at the inner-bottom and deck, and that the greatest value elsewhere is at A, which point coincides with the point of

no shearing force. The points BB on the Bending Moment Diagram are of special interest, as at these points there is no bending moment, and there we have points of inflection or contrary curvature in the elastic curve; a point of inflection being a point where the curve, as viewed from one side, ceases to be concave and begins to be convexed.

In order to find what stress we get in any chosen design of stiffener, we pass to the formula—

$$p = \frac{My}{I},$$

where p = the greatest permissible working stress of the material, measured in tons per square inch;

M = the moment of the resistance which the "beam" offers to being bent; M is measured in tons-inches;

y = the distance from the neutral axis, or axis of no stress, of the bit of metal subjected to the greatest stress; y is measured in inches;

I = the moment of inertia of the section of the beam about the neutral axis; I is measured in inches to the fourth power.

We want to find the stress p, so that we must evaluate M, y and I. The moment (M) of the resistance which the beam offers to being bent, must be equal to that which calls this resistance into being, namely the bending moment on the beam. This bending moment, as we have seen, is greatest at the extreme ends of the beam, but there I is great, owing to the metal in the bracket being added to that of the stiffener, with the result that p will be small. It will be found that where the lower bracket ends we have the greatest stress, because M is still large, whereas I has attained its least value. In getting the moment of inertia of the section of the beam we must take into account not only the stiffener, but a strip of the plating to which it is attached; authorities differ as to the amount of plating which should be taken as adding to the I of the section. If on substituting for M, y and I in the equation for p we do not get balance, then, as p and M cannot be altered, we must change the design of our stiffener, thus altering I and, in general, y.

Having dealt with the strength required by the stiffener, we now turn to the plating which prevents the water from getting past the stiffeners. We take a horizontal strip of this plating and consider it as being a beam fixed at its ends, with a load due to the pressure of water at that depth distributed uniformly along its length. By the method sketched above for the stiffeners, we can now find the thickness of plating necessary to give the required strength; but it must be remembered that in some cases corrosion considerations may require the plate to have a greater thickness than that arrived at by the above calculation.

All that has been said refers to the static pressure of the water on the bulkhead, but in addition to this, if the water be set in motion, we will have a dynamic force coming into play. In the event of the bows being damaged by a collision, steaming ahead would bring such an addition to the static pressure on the collision bulkhead that it would fail in many cases, while the static pressure alone would have had but little effect on it.

Should a compartment become partly filled with water owing to an accident, then the surging to and fro of the water will increase the pressure on the bulkhead much above its static value. Even when the compartment is completely filled and the liquid is no longer free to move, still when starting or stopping the vessel the inertia of the water will cause it to press up against one or other of the bounding bulkheads, so increasing the pressure on the bulkhead above its value when the vessel was at rest, or what amounts to the same thing, in uniform motion. A careful selection of the allowable working stress (p) for the material, will provide for the dynamic as well as for the static forces.

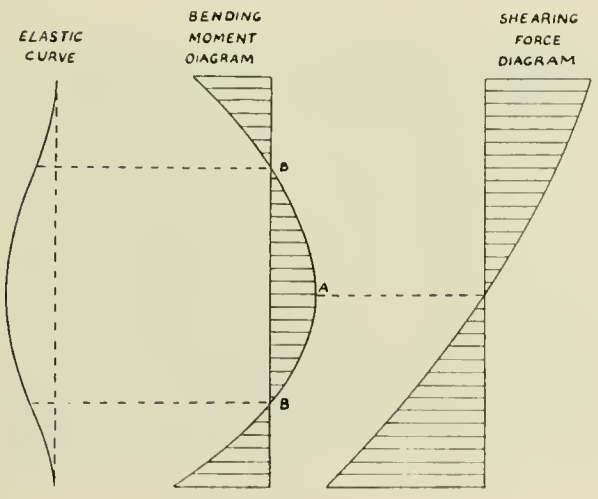


Fig 2.

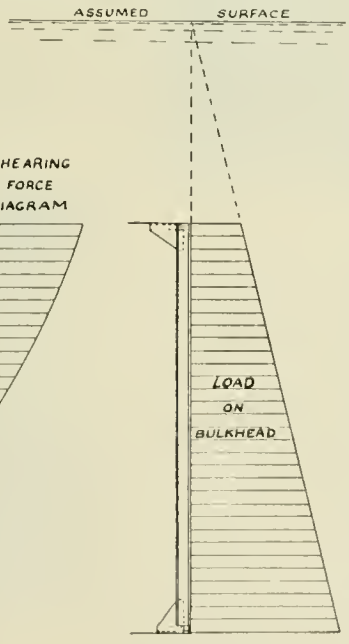


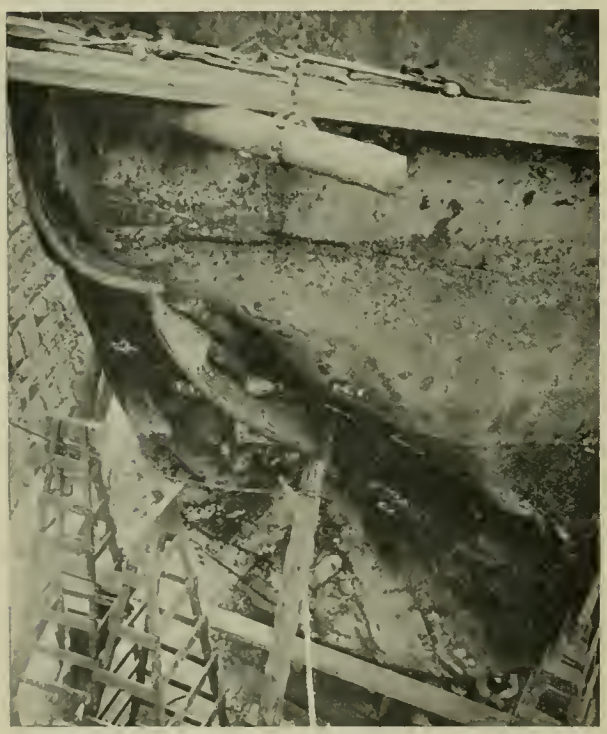
Fig 1

The s.s. *Winamac*, built by Messrs. Craig, Taylor & Co., Ltd., at Thornaby-on-Tees, for the Tank Storage and Carriage Co., Ltd., of London, a report of the launch of which vessel was given in our September issue, has been fitted, together with the other steamers belonging to the latter Company, with a Quenched Spark wireless telegraph installation, manufactured and supplied by Messrs. Siemens Bros. and Co., Ltd., of Woolwich, and not with a Marconi installation as stated in the report of the launch received and published by us.

We understand that Messrs. D Anderson & Son, Ltd., have supplied their "Siderosthen" anti-corrosive solution for coating the holds, bunkers, etc., of the following new steamers:—*Eustace* (Pyman Steamship Co., West Hartlepool), *Transmitter* (Eastern Telegraph Co., Ltd., London), *Ocean Transport* and *Oldfield Grange* (Houlder Brothers and Co., London), *Manchester Civilian* (Manchester Liners, Ltd., Manchester), *Sarap* and *Slav* (Ottoman Line, Ltd., Newport, Mon.), and are at present very busy with a considerable amount of other new and old work.

REPAIRS TO THE S.S. "LLANDUDNO."

THE steamer *Llandudno*, the subject of this article, was built in 1910 by the Tyne Iron Shipbuilding Co., of Willington Quay, to the order of Messrs. Evan Thomas, Radcliffe & Co., of Cardiff. Her dimensions are: length 362 ft. × 50 ft. beam, with a cargo-carrying capacity of 6,800 tons on a draught of 23 ft. Prior to the accident which necessitated the repairs illustrated, she had loaded a full cargo of grain for carriage to Hull at the Southern Argentine port of Bahia Blanca. In the course of her homeward voyage she called at Rio de Janeiro for the purpose of replenishing her bunkers, and it was shortly after leaving this port that the accident occurred. During foggy weather she had the misfortune to strike on some outlying rocks near Cape Frio, and it was found necessary to return to Rio for examination. Following on the



1.—The damaged Bow of the S.S. *Llandudno*.

cabled instructions of the owners, the steamer was docked and cradled with the entire cargo on board, and after examination it was decided to carry out temporary repairs to enable the vessel to proceed on her voyage and so avoid detention in the delivery of her cargo. The temporary repairs were entrusted to the Companhia Commercio and Navegacao, who carried out the repairs in an extremely capable manner to the satisfaction of the owners' representative and Lloyd's surveyor. The vessel subsequently arrived at her discharging port, where the whole cargo was discharged without showing the slightest semblance of damage. After completion of discharge, specifications were issued by the owners for permanent repairs, the leading repairing firms on the N.E. coast, Leith district, London, Southampton, Bristol Channel,

2.—The damage as viewed from the side.

Mersey, Clyde and Belfast being invited to tender. After close competition, the contract was secured by the Mountstuart Dry Docks Ltd., of Cardiff.

The damage proved to be very extensive, the vessel's entire structure forward from above the loadline down to the forefoot and aft to the watertight bulkhead being completely staved in, forming a solid mass of twisted plates and angles. Between and above this twisted ironwork and the bulkhead the space had been bricked and cemented solid. It was necessary to resort to blasting in order to loosen this cement before it could be cut out, so firmly had it been built and embedded by the Companhia Commercio and Navegacao, also great care had to be exercised during the blasting operations so that the collision bulkhead would not be started. The blasting consisted of over 100 charges and the ironwork was gradually cut away by the oxy-acetylene process. The accompanying illustrations will give a very good idea of the difficulties attached to the work. On completion of the

3.—Preparing for blasting.

4.—After one night's blasting.

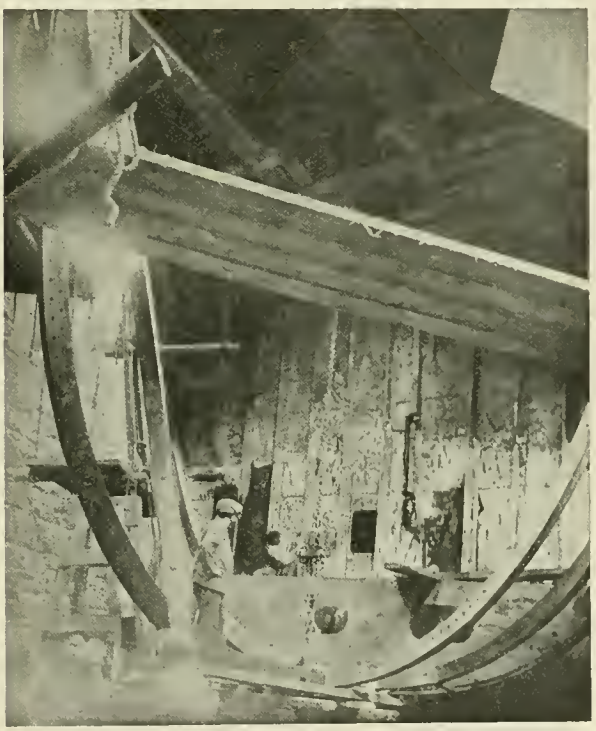
blasting and removals, it was found that the collision bulkhead was entirely intact. When everything was cleared away (illustration No. 6) the work of rebuilding the forward part of the steamer was commenced, which meant building a new bow and forepeak tank with new floors, frames, intercostals, stringers, tank-top, two new keel plates, twenty-four new shell plates and new stem bar, and was carried out in eight days. This was considered a very quick job and proves that the facilities possessed by the Mountstuart Dry Docks Ltd., are of a character which enable them to undertake and carry out the most extensive repairs in a capable and extremely expeditious manner.

HUMPHREY PUMPS FOR SHIP PROPULSION.*

ANOTHER fascinating problem is the question of ship propulsion, and many eminent engineers have ventured to express their opinion that the Humphrey Pump can meet the required conditions in a practical manner. There are two ways of employing the pump for this purpose. The first and simplest is on the lines of jet propulsion, and the second is on the lines of screw propulsion with the screw driven by a water turbine.

5.—A mass of ironwork cut out by the Oxy-Acetylene Process.

Dealing first with jet propulsion, it is well known that if water is allowed to enter a ship at the bow with a certain velocity, and then by some mechanism this velocity is increased so that the water leaves the ship at this increased velocity through a jet at the stern, then the change of momentum in the water, relatively to the surrounding water, represents work available for driving the ship forward. Suppose, for example, that the water enters the ship without hindrance at the speed S of the ship and has impressed upon it an additional velocity U with as little frictional loss as possible. The thrust T which drives the ship forward is proportional to the work W done on the water divided by S and the area A of the intake jet is equal to $\frac{T}{2SU}$. Calculations show that if S and U are



6.—Starting to rebuild the forward part of the *Llandudno*.

made equal, as would be good practice for comparatively slow boats, the efficiency of the jet propeller would be 66 %, or rather better than the best known screw propeller. The added velocity U may be called the "slip," and it is of importance that for fast boats the slip may be reduced, and consequently a higher efficiency obtained. Mr. Rankin Kennedy has shown that a 10-knot tramp steamer with 1000 h.p. engine would usually employ a 16-ft. diameter screw, but if such a boat is jet propelled two nozzles of 35 inch diameter would suffice to drive the boat at the same speed, and there would be the added economy arising from the use of the internal combustion principle.

* Referring to the note on Internal Combustion Engines, page 431 of our June issue, we are able, by the courtesy of Mr. Humphrey, to print an extract from that part of his lecture before the Royal Institution, which dealt with the application of Humphrey pumps to the propulsion of ships.

Fig. 1.—Humphrey Pump situated longitudinally in a boat.

In the past, jet propulsion has been tried with results which only fall short of complete success by reason of the inefficiency of the types of centrifugal pumping machinery available at that time. In fact, to obtain a water horse power required nearly three times as much coal as does the Humphrey Pump; but even then the reports were not entirely unfavourable.

In diagrammatic form, Fig. 1 shows a Humphrey Pump situated longitudinally in a boat. Water enters on the left as the ship moves forward, and its velocity relatively to the ship is slowed down and its pressure increased by means of the tapering pipe and air vessel. The water, having attained the velocity of the boat, enters the pump through the usual water valves and is delivered into a second air vessel which retains its store of water under added pressure. From this second vessel the water passes to the jet and so out at the stern of the boat, but the jet is contracted so that its area is say only one half of the area of the intake. The arrangement shown would need some modification because of the unbalanced inertia forces resulting from the use of a single play pipe for the oscillating water. If, therefore, the problem is solved it will have to be with Humphrey Pumps of the kind where there are two pumps having a common combustion chamber about which they are arranged symmetrically. By this means balance of all forces except the one force which drives the boat may be brought about, and the pumps would have solid pistons separating the water from the gas so that high speeds and large power outputs may be rendered possible.

Another variation of the system would be to use a Humphrey Pump of the type in which there is a continuous flow through the pump, and in which forward impulses are given to the water, by means of explosions, at regular intervals.

As regards the combination of Humphrey Pump, turbine, and screw propeller, this needs no explanation and has the advantage that the same water may be used again and again, so that the intake of floating matter is avoided. There appear to be no unsurmountable difficulties in any of these systems, and experiments on these lines would be very interesting.

OBITUARY.

John Gibb Dunlop.

THE death took place on Sept. 3rd, at his residence in Dowanhill, Glasgow, of Mr. John Gibb Dunlop, late managing director of the firm of Messrs. John Brown and Co., Ltd., shipbuilders and engineers, Clydebank, and from 1887 associated with the same establishment, while still in the hands of the original founders, Messrs. James and George Thomson. Born about sixty-seven years ago, Mr. Dunlop began his apprenticeship to engineering in 1864 in the works of Messrs. Randolph, Elder & Co., then situated in Centre Street, Glasgow. This firm, dominated by the genius and enterprise of John Elder, having added to the original millwright business a marine engineering branch, Mr. Dunlop, in the presence of Elder's enthusiastic efforts and achievements in the development of the marine steam engine, became infused with that keen interest in his profession which he retained throughout his long and successful career. In the course of this career, briefly stated, he was associated directly with compound, triple-expansion and quadruple-expansion reciprocating engines, and with the development of the marine steam turbine, up to and including the completion of the Cunard Line steamship *Lusitania* in 1907, which at the time of her launch was the largest steamship in the world, and of several of the later vessels built at the Clydebank works. Mr. Dunlop continued with the firm of Messrs. Randolph, Elder & Co. when they removed to Fairfield and commenced shipbuilding, the concern for a time being known as John Elder & Co., and latterly as the Fairfield Shipbuilding and Engineering Co., Ltd. At Fairfield Mr. Dunlop was engineering manager, and during that time he was associated with others in the engining of notable vessels, both for mercantile and naval service. In 1879 Mr. Dunlop became superintendent engineer of the Orient Line, and under his *regime* the steamships *Orient*, *Austral* and *Ormuz* were added to the fleet of the Company; the last-named vessel being the first in the Australian service to have propulsive machinery of the quadruple-expansion type. Other innovations in ocean-going steamers with which Mr. Dunlop was associated were refrigerating plant for the preservation of food on boardship, and electric lighting by incandescent lamps. In 1887 Mr. Dunlop returned to the Clyde to take control of the engineering departments at Clydebank shipyard while the establishment was still in the hands of Messrs. James and George Thomson. Under his control the machinery for many notable steamers for ocean service was produced, including that for the epoch-making Atlantic liners *City of New York* and *City of Paris*. The Clydebank works, which had been owned for a short time by the Clydebank Engineering and Shipbuilding Co., Ltd., was taken over in 1899 by Messrs. John Brown & Co., Ltd., steel and armour plate manufacturers, Sheffield, and Mr. Dunlop, who had been a director of the old Company, became resident director, and was later made one of the two joint managing directors of the Company. In these positions he was associated with the construction and powering of a long succession of large liners, most of them of the high-class intermediate type, but some of them notable vessels in design, equipment and speed. Outstanding liners were the Cunarders *Saxonia*, *Caronia*, *Carmania* and *Lusitania*. In the construction of the last-named vessel especially, and of her powerful turbine machinery, Mr. Dunlop took a great personal interest. During his career at Clydebank, in addition to numerous fine steam yachts and fast Channel steamers, Mr. Dunlop directed the construction of many warships, including the battleships *Ramilies*, *Jupiter* and *Hindustan*, the Japanese battleship *Asahi*, the cruisers *Ariadne*, *Europa*, *Terrible*, *Leviathan*, *Antrim*, *Sutlej*, *Bacchante* and *Inflexible*, as well as a large number of torpedo-boat destroyers for home and foreign governments. Mr. Dunlop resigned from the firm of Messrs. John Brown & Co. in 1909, and has since lived almost wholly in retirement. He was a member of the Institution of Engineers and Shipbuilders in Scotland, and for many years a member of Council of the Institution of Naval Architects. He is survived by a widow, one son and two daughters.

LIGHTHOUSES ON THE COAST OF CORNWALL.

THE rugged coast-line of Cornwall has ever been associated with wrecks, and in the days of long ago when a ship came within the outer line of safety she was looked upon as the legitimate prey of the wreckers, who appeared to consider it quite proper to appropriate all that entered the waters of their particular bay. The reef of rocks, on which the lighthouse known as the Longships is built, is one of the most dangerous around the coast, being so far removed from the mainland and almost in the fair way of vessels going up the west coast. The story of the opposition to the erection of this lighthouse has been woven into the pages of fiction, and to read it within reach of the rock-girt coast and the inviting coves, one can readily understand the situation and appreciate the incidents described. The Longships light is placed on the rocks, which are about two miles to the north-west out to sea from Land's End, the nearest bay being Sennen Cove, and on the headland adjoining the cove is a coast-guard signalling station. A light was first exhibited on the Longships on September 29th, 1795, and the present structure, a circular grey granite tower, 117 feet high, was erected in 1873. The light is white (with two red sectors) and has an intensity of 35,000 candle power; its character is occulting, the eclipse being of three seconds' duration every minute. The focal plane of the light is 110 feet above sea level, and the light is visible in clear weather for a distance of sixteen miles. There is an explosive fog signal at this lighthouse, which gives two reports every five minutes, with an interval between the two reports of five seconds. About 7½ miles to the south-west of the Longships stands the Wolf Rock Lighthouse, which was established in 1870. The light of 70,000 candle power, with a focus 110 feet above high-water mark, shows a flash every fifteen seconds of white and red alternately, and on a clear night can be seen for a distance of sixteen miles. The fog reed-horn on the lighthouse gives a four seconds' blast every thirty seconds, and the sound of the horn is very penetrating and gives a good warning note. The compressed air for the horn is supplied by an oil motor, fitted in the second floor of the lighthouse building. The lower floor is devoted to the storage of provisions and gear for the keepers, while the third, fourth and fifth floors are occupied as the living room, the sleeping room, and the watch-keeping room respectively.

The Longships Light.

The Wolf Rock Light.

The post of light-keeper is one which has formerly been referred to as one calling for great sympathy towards those who are shut up as in a tower, but in many cases it is by no means so monotonous and uninteresting as it may appear. It depends to a great extent on the personality of each one of the crew of the lighthouse how far the lives of all may be spent pleasantly or otherwise, and that this is realized can be gathered from the experiences of many who have served for years comfortably with good messmates. It is much the same on a steamer, with a difference in degree, the area being greater and the confinement less restricted. The crew of the Wolf Lighthouse consists of four men, who spend each two months at the rock and one month on the mainland. In February, 1913, the conditions of the sea and weather were such that the rock could not be approached, and the relief of the crew was delayed forty-nine days beyond the due date, a fact which helps to enable one to realize the difficulties and the dangers involved in building the lighthouse, during the ten years it was in course of construction on the reef which is only exposed at low water. In calm weather, the ledge on which the structure rests can be approached, and a landing readily effected, but as the rush of the tides is very severe around the reef, care requires to be exercised in guiding the boat to the step. The illustrations of the Wolf and Longships given, show calm seas and fine weather; under different conditions the tempestuous waves envelop the tower, and then it is that the discomfort of the keepers is enhanced and their walls shaken. We are indebted to The Lighthouse Literature Mission for the illustrations.

There are three men always on the rock, and in order that each man shall have one month on shore out of every three, the services of a young supernumerary keeper are requisitioned every third month.

FOREIGN NOTES.

Austria.

On 21st August the Stabilimento Tecnico, Triestino, Cantiere San Marco, launched their 484th vessel named s.s. *Nimrod*, which has been built in about five and half months, for the Navigazione Generale Austriaca, Gerolinisch & Co., Trieste. The vessel is of the following dimensions :—430 ft. by 54 ft. by 32 ft. 6 in., and the engine has been supplied by Messrs. T. G. Kincaid & Co., Ltd., Greenock. This is of the triple-expansion type and develops about 2,600 i.h.p. with three single-end boilers. The contract speed is 10½ knots loaded, but about a knot more is expected to be obtained. On the maximum draught of 24 ft. 6 in. she will displace about 14,000 tons. The crew is berthed in the forecastle, the engineers and officers in the bridge 'tween deck, the mess rooms are also here. Thirteen winches with fourteen derricks are fitted for dealing with the cargo, the hatches are very large and the vessel has been built under special survey to take the highest class of Lloyd's and Austrian Veritas.

The s.s. *Belvedere*, described in our May issue, sailed on 26th August for her first voyage to Canada.

The Cantiere Navale Triestino, Monfalcone, have built to the order of the Austro-Americana Trieste, a large passenger and cargo steamer. The passenger accommodation is mostly reserved for emigrants, of which class she can carry about 1,800 persons. Accommodation is also provided for 12 first-class and 130 second-class. The vessel has been built to the highest class 100, A1 of Lloyd's Register under special survey, and the engine has been supplied by Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend, and is of the triple-expansion type developing 4,200 i.h.p. On trials a speed of 14·2 knots was obtained. On August 26th the Cantiere Danubius of Fiume launched the high speed T.B. destroyer *Orient* for the Austrian Government and delivered her sister ship the *Tatra*, whose trials were very good, a mean speed of 33·25 knots being obtained.

Holland.

The De Schelde shipyard at Flushing have just launched a submarine which is intended for service with the East Indian squadron. The displacement of the vessel is 320 tons when submerged and it is to have a speed of 11 knots under water and 16 knots surface speed. On 20th August the twin-screw steamer *Prins Der Nederlander* was launched at Amsterdam. The vessel, which has been built to the order of the Stoomvaart Maatschappij Nederland, is 481 ft. in length, 57 ft. beam, depth to shelter deck 37 ft. 11½ in. The engines are of the quadruple-expansion type and develop 5,350 i.h.p. and are designed to give a speed of 15 knots to the vessel.

Italy.

The keels of the Colonial cruisers *Campania* and *Basilicata* were laid at Castellamare on the 9th of August. The *Splendor* has just been successfully launched at the Odero shipyard at Genoa to the order of the Italo-American Petroleum Company. Her length is 122·5 m., beam 16·7 m., and her carrying capacity 8,600 tons, including 1,000 tons in bunkers. The contract speed is 9·5 knots. As the propelling machinery was already installed the trial trip soon followed, when the engine developed 2,200 i.h.p. and the speed of 11 knots was attained. A second tank steamer of similar dimensions is also on order at this shipyard.

Germany.

An interesting motor craft has been recently launched from the yard of the Havelwerft, formerly Hoffman & Co., at Potsdam, to the order of the Kaiser Wilhelm Society for the Advancement of Science. The boat in question, the *Albatross*, has been built to take the place of a small motor boat and a converted steam tug which have hitherto been engaged in the work of deep-sea fishing in the Mediterranean at the Zoological Station at Rovigno. She is 62 ft. 6 in. long by 13 ft. beam, with a draught of 6 ft. 6 in., and has accommodation for the scientists engaged in biological research. She is to be fitted with a 100 brake horse-power Junkers Diesel engine (specially designed by Dr. Junkers) formerly Messrs. Klein Brothers, of Dahlbruck. The machinery is now being fitted on board, and the ship is expected to take up her station in the Mediterranean in the course of the next few months, after extensive trials in the North Sea. She is designed to have a speed of about 10 knots, and should prove well fitted for the work she is to undertake.

The cargo steamer *Hornsund* built to the order of the H. C. Horn shippers at the Koch shipyard at Lübeck has just been successfully launched. Her carrying capacity is 6,750 tons and she will be equipped with propelling machinery of 2,000 i.h.p., which will give the vessel a speed of 11 knots. She is to be completed in the course of this year and will then commence her service to American ports at once. The triple cargo and passenger steamer *Cap Trafalgar* was successfully launched at the Vulcan shipyard at Hamburg, where she has been built to the order of the Hamburg-South American Steamship Co. She will run on the La Plata service and carry passengers and cargo. The dimensions are :—length over all 180 m., beam 22·0 m., draught 8·54 m., on a load of 9,000 tons and her speed will be 18 knots. The vessel, which will have all modern improvements, will carry 1,575 passengers.

The firm Schichau has now completed the new shipyard at Narwa, near Riga, and it is to be at once utilized for the construction of war vessels.

France.

The Chantiers de la Loire have just completed the large steel cargo steamer *Saint Louis* of 7,800 tons carrying capacity, built to the order of the Oceanic Company. She is destined to undertake long voyages in the Pacific and Indian Oceans. The trial runs have been extremely successful and the vessel attained her contract speed of 10·75 knots with ease, reaching 12·6 knots during part of her trial of four hours, when fully loaded, and her engine developing 3,000 i.h.p.

The large mail steamer *Gallia* is rapidly approaching completion at the Chantiers de la Seyne, where she has been built to the order of the South Atlantic Co. At the same shipyard work on the large trans-Atlantic liner *Patria* of the Cyprien Fobre Co. is also being pushed forward. The cargo steamer *Anna-Eugénie* of 2,416 tons has been sold by the French owners to a shipping firm at Argostoli.

The cargo and passenger steamer *Champlain* has just been launched at the Chantiers de la Loire, where she has been built to the order of the Chargeurs Réunis of Havre. The vessel has a carrying capacity of 8,650 tons, and is provided with propelling machinery of 4,000 i.h.p., which will give the vessel a speed of 12 knots. The mail steamer *Haiti* has just been successfully launched at the Chantiers de Provence at Port-de-Bouc to the order of the General Trans-Atlantic Company. The *Haiti* is a twin-screw steamer of 8,600 tons and is to be run on the Antilles service. Two engines of 4,500 i.h.p. will propel her at a speed of 14·75 knots. The *Haiti* will be able to accommodate 103 first-class, 32 second-class passengers and 394 emigrants, and is fitted with all modern improvements.

The cargo steamer *Blavet* has just been launched at the Chantiers de Bretagne, where she has been constructed to the order of the Labrise Company at Lorient. She has a carrying capacity of 1,200 tons, and is intended for service on the coast.

The French Naval authorities contemplate the construction of a fifth "Dreadnought" of 25,000 tons to carry twelve guns. A large sum of money is to be expended on the extension and up-to-date equipment of the arsenal at Lorient.

Denmark.

Two of the four motor vessels ordered by the Nordstjernan Steamship Co. at Stockholm, from Messrs. Burmeister and Wain's shipyard at Copenhagen, have now been completed and have commenced their duties on the La Plata line. The keel of the third vessel has just been laid and that of the fourth is also shortly to be taken in hand, both are also destined for the La Plata service. The dimensions are :—Length 110·34 m., beam 1·55 m., with a carrying capacity of 6,600 tons, and each will be equipped with two four-cycle motors of 1,000 i.h.p. The motor vessel *California* of 8,000 tons, in course of construction at the same shipyard, has been launched. She is destined for the American service and will be equipped with two Diesel motors of 2,600 i.h.p., giving her a speed of 11 knots. The length is 405 ft., beam 54 ft. and depth 27 ft.

U.S.A.

It has been definitely decided to place the construction of the "No. 39" battleship with the Government dockyard at New York. This vessel is to be 31,900 tons, length 185·3 m.

beam 29·5 m., and her artillery will consist of twelve guns. The cost of "No. 39," including armour and artillery will amount to about £2,220,000. The Carbon Steel Company has received the order for 3,960 tons of armour plates at the price of £38 per ton, this price being 36% lower than that of the last order. It is reported that a new project is being considered to increase the strength of the fleet and the construction of at least two "Dreadnoughts" will be at once commenced. The Fore River Shipbuilding Corporation in Quincey, Mass., has been now re-organized by the Bethlehem Steel Corporation, which has taken it over. The Company has orders for two cargo steamers of 400 feet length, which are to cost £100,000 and are the first ships of the fleet projected by the Bethlehem Steel Corporation, to undertake the transport of the iron ore acquired by the Corporation in Chili to Philadelphia.

MARINE MOTOR NOTES.

THE increasing importance in the public view of the services rendered to the community in various ways by oil, has not only emphasized the researches of the chemist in the laboratory, but the investigations of the prospector. The engineer is largely indebted to the former for the results of analyses, which are a guide in the direction of improvements and economies, and to the latter for the discovery of new districts containing deposits suitable for industrial development. The recent report as to the presence of shale in the island of Skye was probably not unexpected by those who have visited the spot and have examined the samples of coal found on the island; it remains however, to be determined whether or not the deposits are sufficiently generous to yield a working profit to the investor; should they do so, it will be the means of adding a welcome addition to the industries of the West of Scotland and will be much appreciated in several quarters. The launch of another vessel for the Scottish Motor Shipping Company by Messrs. McGregor & Sons at Kirkintilloch has added one more to the fleet of Oil Motor Coasters; this is the eighth one built for the Company by Messrs. McGregor and the type of Motor to be installed is the Kromhout. The locks of the Forth and Clyde Canal have not length enough to admit the largest coasters so that their service is confined to the West Coast; the *Innishowen* was built with a portable bow to accommodate her to the available space on the way to Glasgow for delivery. The promoters of the proposed ship canal from the Forth to the Clyde, are urging attention to the advantages of such a waterway, on national as well as on commercial grounds; the costliness of the projected undertaking is one of the elemental objections to it, when considered in connection with the probable income derivable from dues.

The model yacht clubs have some interesting races with motor boats on the various ponds and lakes suitable for the purpose, and our attention has been called to some of these specially. On August 30th, a successful regatta was conducted on the lake at Wanstead under the auspices of the Forest Gate Model Power Boat Club. There were many entries under each of the classes and the prizes were well won by the winning competitors. The Canadian Motor vessel *Fordonian*, built on the Clyde for service on the lakes, is reported to be giving very satisfactory and improving results in respect to speed and fuel consumption; special note is also made to the effect that the auxiliary compressor has seldom been required, that fitted on the main engine being sufficient for the purpose. It is pleasing to have this report from the scene of action, as it shows that the early trouble experienced with the machinery has been overcome. The fuel consumption per I.H.P. for a 280 I.H.P. oil motor to drive a cargo barge about 9 knots has been found in practice to be about ·4 pint, the lubricating oil about ·75 gal. per hour for all purposes; revs. 300, with a propeller pitch of 4 feet.

The motor ketch, *Fort Churchill*, fitted with a Bolinders engine.

On the coast of North Wales, among the yachts and pleasure boats, we observed an auxiliary motor yacht, which illustrated the advantage accruing from the fitting of the propeller power in that it enabled the owner and his friends to accomplish more than could have been planned in the time with sails alone. Small boats fitted with motors, including the *Evinrude*, hung over the stern, were seen cruising around and a new coasting vessel intended to trade regularly from the Dee to Liverpool has run her official trials satisfactorily. She is fitted with a Bolinders engine of about 120 h.p. The references to inland navigation and the upkeep of a good canal system, at the meeting of the British Association, were well worthy of a fuller consideration and development with a view to placing the wayside and country traffic on a more favourable foundation. The railway-owned canals might with advantage be made more profitable to all concerned.

Another motor boat came to grief in Ballachulish Bay during the past month, owing to a fire; the owner and his friends had an exciting experience, attended by some risk, in escaping to the shore. The motor boat races for the British International Trophy have been well run this year; the French boat gained the first day, but the British boat, *Maple-leaf IV.*, was the winner on the second and third days, hence the palm of victory was awarded to her for making two bests out of three. The trials of the Sulzer-Diesel locomotive in Germany, carried out from Berlin are interesting and show the possibilities in connection with an oil motor drive for railway service. Messrs. Beardmore have received an order for an engine of 60 and one of 120 h.p. for New Zealand, and four sets of engines of 130 h.p. for China, all of the direct reversible type. There are enquiries in the market for barges fitted with oil motors for Admiralty requirements, also for vessels with oil motors to trade around the estuary of the Thames.

The illustration shows a motor ketch, the *Fort Churchill*, which has left Penzance for her place name in Canada. She was built by Messrs. Kitto, Porthleven, Cornwall, and is fitted with Bolinders engines and is intended for the service of the Hudson's Bay Co. to carry produce from the hunting grounds to the large depots. It is interesting to note that Captain Nielson, who is in command of this vessel till she reaches her destination, took out a smaller craft, the *Lingueta*, and also the *Bermuda* dry dock. The number of firms engaged in the manufacture of motors is increasing and the new works specially erected for dealing with oil engines are well under way or have begun operations.

INSTITUTE OF MARINE ENGINEERS.—ANNUAL DINNER.—It has been announced that the annual dinner of the Institute will be held on November 21st. In anticipation of a large demand for seats, owing to the popularity of this event in recent years, the Council have secured the use of the Grand Hall, Hotel Cecil, Strand, London, for the occasion. Tickets may be obtained from any members of the Council or Committee, or on application to the Institute, 58, Romford Road, Stratford, where a plan showing the seating at the various tables may be seen. Mr. Thomas L. Devitt will deliver his presidential address to the Institute of Marine Engineers on November 3rd.

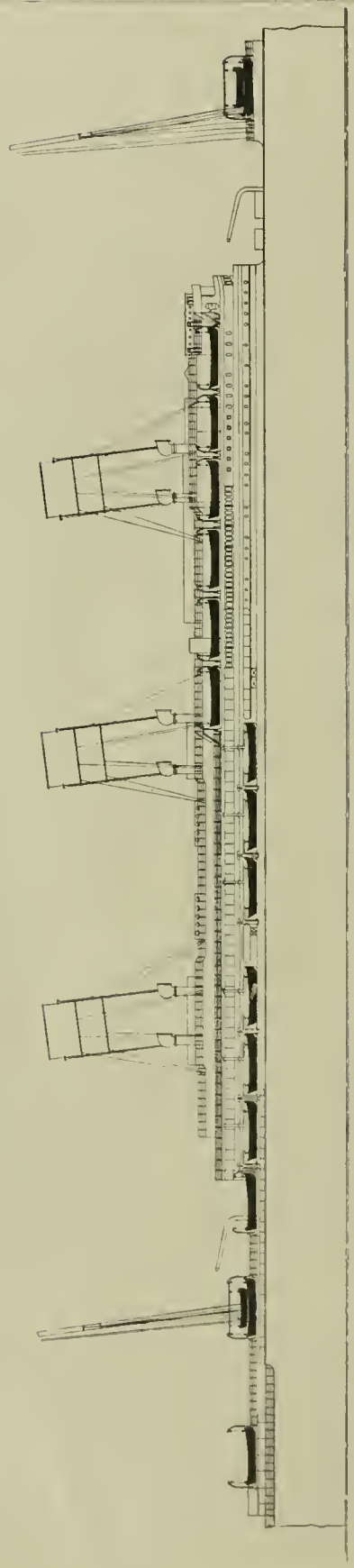


Fig. 1. Profile view of the Hamburg-American Co.'s *Imperator*, showing boat arrangement.

SHIPS' BOATS AND HANDLING GEAR.

THE prominence into which the subject of ships' boats was forced last year by the disaster to the *Titanic*, has caused much thought and ingenuity to be exercised as to finding some solutions to the difficult problems set up by the requirements of the public on the one hand, and the possibilities of supplying them, having regard to the wishes of the ship owners, on the other. The cry of "boats for all" has developed some remarkable and drastic changes in arrangements in order to enable such a large number of boats as become necessary under these conditions to be effectively handled, and it is interesting to review some of the arrangements already carried out by The Welin Davit & Engineering Co., Ltd., on board the *Olympic* and *Imperator*, the installation on the latter being well illustrated by the accompanying diagrams.

It will be remembered that the original complement of the *Olympic* was twenty boats; this has now been extended to sixty-eight, the vacant space amidships between the two original groups has now been filled up, the boats being arranged in double tiers all along the deck. At certain parts "double banking" has been resorted to, the davits in such case being of the double acting type, to facilitate quick handling. Non-toppling blocks have been fitted throughout to

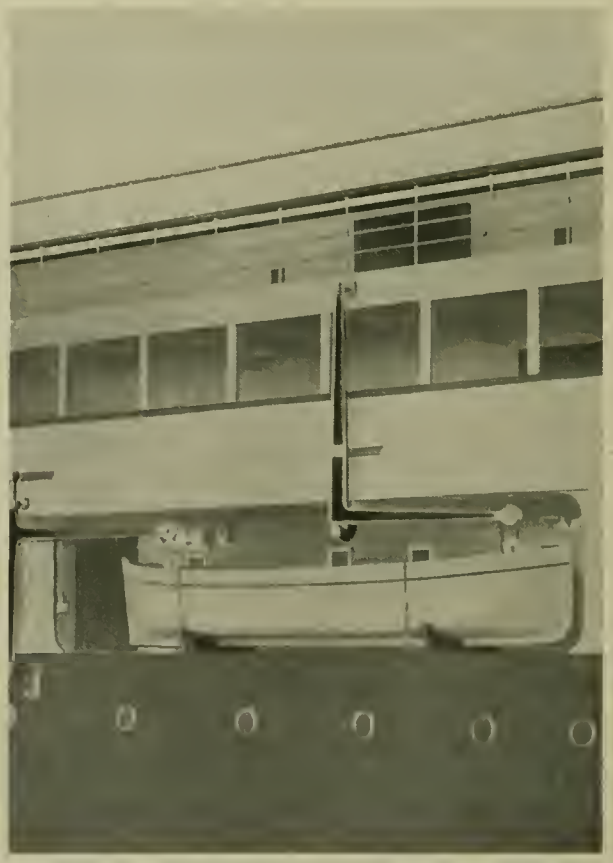


Fig. 2.

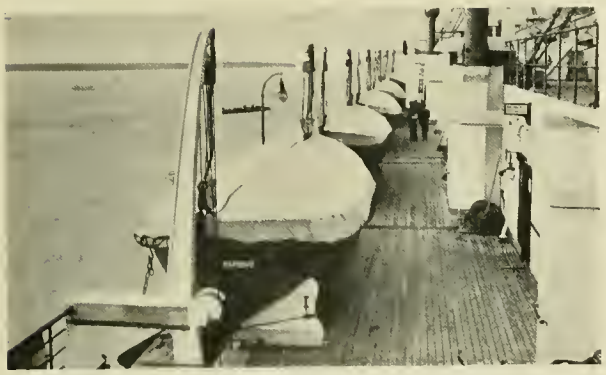


Fig. 3. Lifeboats on promenade deck of the *Imperator*.

facilitate the rounding up of the tackle, and an improved type of chock has been adopted. The unusually large deck space available has enabled a commendable degree of efficiency to be obtained.

No doubt regrets will be felt as to this unavoidable obstruction of the magnificent playground which the unobstructed boat-deck of the *Olympic* formerly provided, but some sacrifice had of necessity to be made. With such a complement of boats it follows that their utility will be small unless there is on board a proper complement of men capable of handling them, and assuming that four be allocated to each boat, this would number 272 boatmen who are really experts at the job, and not of the usual type of men employed on these liners.

There is, perhaps, no modern installation of boats which offers so many points of interest as that on the *Imperator*, the side view of which is shown on Fig. 1. In this case it will be noted that a large number of the boats, usually located on the top deck, have been placed on the lower promenade deck, 20 feet below the top deck. One of the reasons was the fact that the promenade deck was little used by passengers, and by sacrificing a proportionate part of the lower deck, a very attractive portion of the boat deck has been retained for passengers' use, a feature which the travelling public will readily appreciate and recognise.

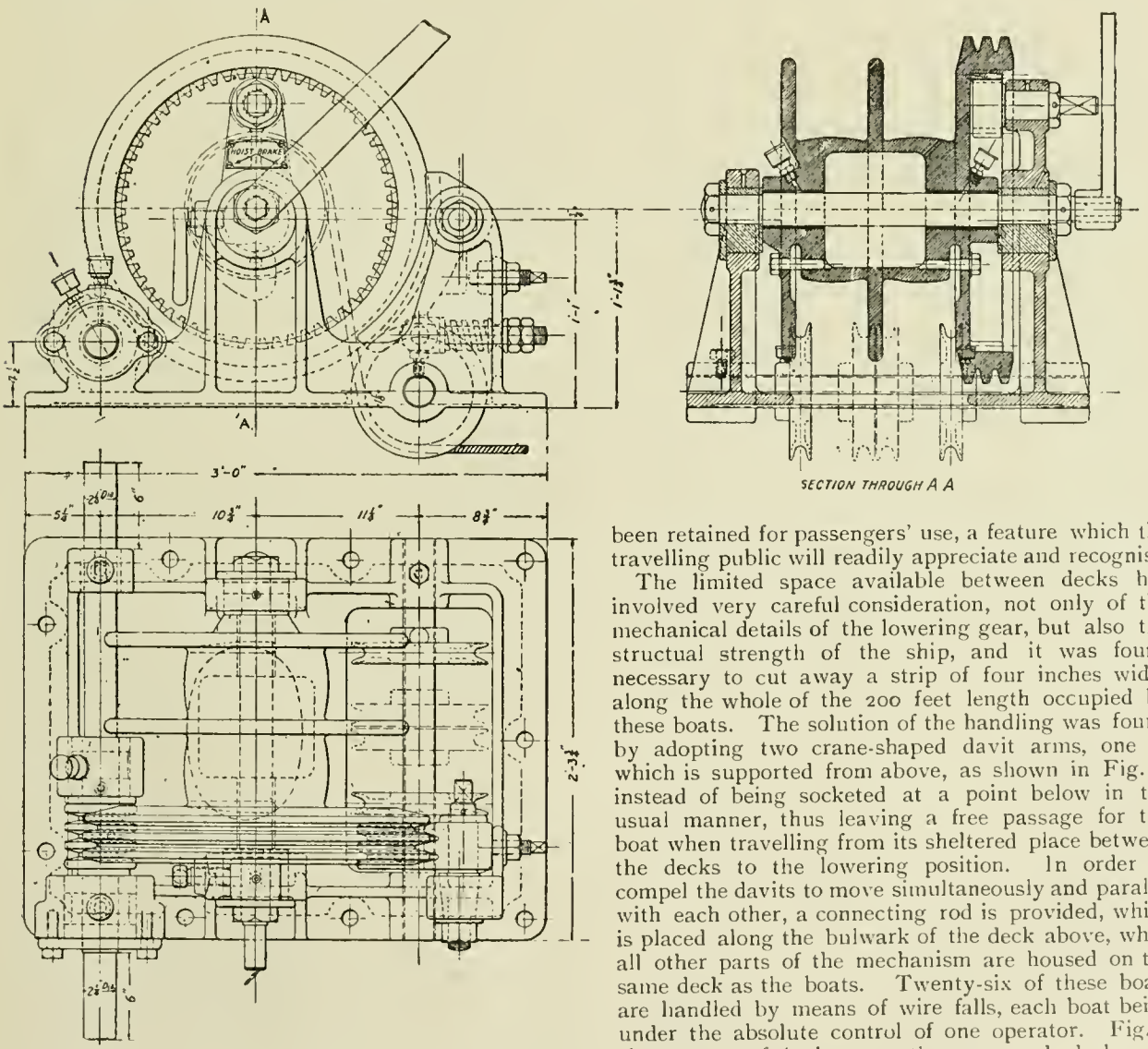


Fig. 4.

The limited space available between decks has involved very careful consideration, not only of the mechanical details of the lowering gear, but also the structual strength of the ship, and it was found necessary to cut away a strip of four inches width along the whole of the 200 feet length occupied by these boats. The solution of the handling was found by adopting two crane-shaped davit arms, one of which is supported from above, as shown in Fig. 2, instead of being socketed at a point below in the usual manner, thus leaving a free passage for the boat when travelling from its sheltered place between the decks to the lowering position. In order to compel the davits to move simultaneously and parallel with each other, a connecting rod is provided, which is placed along the bulwark of the deck above, while all other parts of the mechanism are housed on the same deck as the boats. Twenty-six of these boats are handled by means of wire falls, each boat being under the absolute control of one operator. Fig. 3 shows some of the boats on the promenade deck.

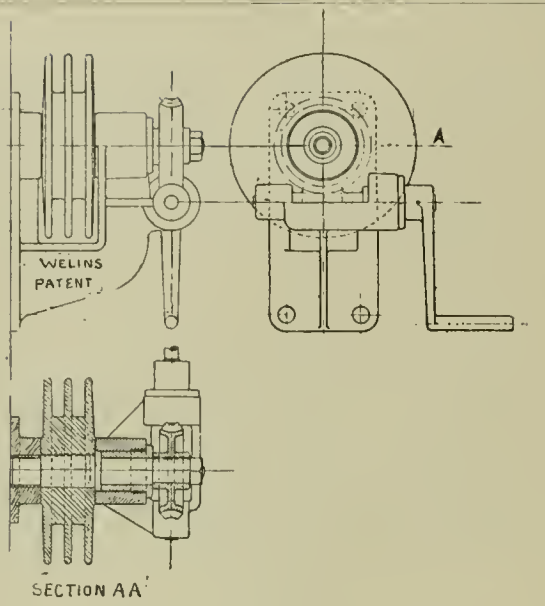


Fig. 5.

It is interesting to note that when the *Imperator* grounded on leaving the shipyard the first time and it was necessary to lighten the ship as much as possible, boat after boat was lowered away, sometimes by one man, sometimes by another, at an average time of fifteen seconds, which corresponds to a lowering speed of from four to five feet per second. It was proved over and over again in the test that the descent could be instantly checked without unduly straining the mechanism.

In Fig. 4 a control arrangement is illustrated, in which a hand brake is the controlling agent, and the hoisting is effected by means of a power-operated transmission shaft provided with a friction drive. The braking arrangement is so effectual that, even assuming a careless operator, no apprehension need be felt on this score, as the brake is so sensitive and reliable that the provision of a speed governor would be an unnecessary complication, particularly as in the event of the operator accidentally dropping the brake lever, the brake automatically goes on and gradually checks the descent of the boat. In trimming a boat before launching, difficulties have arisen owing to the slacked part of the checked rope being liable to kink where the rope passes through a check block provided with a stopper. To overcome this difficulty a balance fall-adjuster has been designed of the form shown in Fig. 5. The standing part of each tackle is led over sheaves to the adjuster-drum, and from 12 to 20 feet wound thereon in opposite directions. The drum is actuated by a self-locking worm, and when revolved pays out one fall and hauls in the other approximately in equal lengths. In this way the falls are always under tension and all possibility of kinking prevented. It is now appreciated fully, and insisted on by authorities, that some arrangement of this nature is absolutely necessary to the satisfactory and safe working of any drum-lowering gear.

These two examples of boat installations, in our opinion, afford excellent evidence of the ingenuity and care displayed by The Welin Davit & Engineering Co., Ltd., in solving the difficult problems set them, and they are to be warmly congratulated on the result.

PERFORMANCES OF THE MOTOR SHIP "MONTE PENEDO."

THE *Monte Penedo*, described and illustrated in The Marine Engineer and Naval Architect of October, 1912, is a cargo boat of 4,000 tons gross register and about 6,500 tons deadweight carrying capacity, her length being 350 ft., beam 50 ft., depth 27 ft. She has been constructed by the Howaldtswerke, Kiel, Germany, and is propelled by two four-cylinder reversible two-cycle Diesel-Sulzer engines, built by Messrs. Sulzer Bros., Winterthur, Switzerland. The capacity of one engine is 850 shaft horse-power at 160 r.p.m. The vessel was built for the Hamburg-South American Line, and runs now between New York and Brazilian ports (Atlas service). She completed her trial trip in August, 1912, and left Hamburg on her maiden voyage to South America on the last day of August, 1912. Since then she has made another round trip to Hamburg and visited several ports in South America.

The voyages undertaken by the vessel have been as follows: Last trip from Hamburg-Lissabon to Rio Grande—time, 27 days 11·1 hours. Distance, 6,340 miles—average speed of vessel, 9·6 miles per hour. Lead of propellers, 7,744 miles = 11·7 miles per hour (loss 1,404 miles = 18·1 per cent.).

Trip from Rio Grande-Victoria (Brazil) to New York—time, 21 days 15·8 hours. Distance, 5,552 miles = 10·7 miles per hour. Lead of propellers, 6,375 miles = 12·3 miles per hour (loss 823 miles = 12·9 per cent.).

Hamburg-Lissabon-Rio Grande-Victoria (Brazil) to New York—time, 49 days 2·9 hours. Distance, 11,892 miles = 10·1 miles per hour. Lead of propellers, 14,119 miles = 12 miles per hour (loss 2,227 miles = 15·8 per cent.).

On the previous trip from Montevideo to Hamburg the distance was covered in thirty-one days without any stopping, either in harbour or on the sea. To date the ship has covered over 30,000 miles on regular voyage. The average fuel consumption in twenty-four hours has been 7·08 tons metric. Lubricating oil consumption in twenty-four hours, 157 kilogrammes (including lubrication of all auxiliary engines). Cylinder oil consumption in twenty-four hours, 21·5 kilogrammes. The fuel used is a gas oil of specific gravity 0·86 to 0·89.

An inspection of the engines of the *Monte Penedo* was made in July last by an engineer for an American firm, and Messrs. Sulzer have sent us a copy of this gentleman's report, which reads as follows:—

I got aboard the ship shortly after she docked at Pier 26 in Brooklyn, on July 11th, 1913. My first visit was to the engine-room, and the engines certainly made a very good impression, and cannot have looked better on the test floor of the manufacturer. Another proof of the good condition of the engines may be gained from the fact that practically no repair work, out of the ordinary, had to be done at all, and the engineers and helpers were free to go on land on the day of arrival in port. The same conditions as prevailed for the main engines apply also to the two auxiliary sets. On the first visit to the engine-room I was accompanied by the second engineer; while on my second visit on the following day I went more into details with the chief engineer, Mr. Heinmann. What follows is a record of observations and discussions with these two gentlemen.

As mentioned before, the general appearance of the engine-room and engines is a very good one; and, in my opinion, is very creditable to the men in charge of the ship's power plant. In order to inspect a cylinder head and a piston, one cylinder head had been taken off and the piston taken out and dismantled. The wearing surfaces on the piston, piston rings, and especially in the cylinder, were in perfect condition; the latter as smooth as a mirror. The parts of cylinder cover and piston forming the combustion space appeared black, as if covered with a thin coat of paint. No unduly large carbon deposits were visible. Neither was this the case in the exhaust ports. The fingers would not get blackened by reaching into them. No trouble was experienced on any of the main bearings, pins or crosshead-guides. The parts requiring the most attention are the valves for the cooling water, and bilge pumps, and for the air compressor. The fuel pump packing seems to be tight and no leakage was visible.

The engines normally run at 140 r.p.m. Pure cylinder oil is used for lubricating the cylinders. The forced lubricating system works all right. Sea water is used for cylinder jacket, piston and oil cooling. The speed of the engines can be reduced to 70 r.p.m. without cutting out any cylinders, and this is sufficient for all practical purposes. Reversing can be done in five to seven seconds. The temperature in engine-room was never excessive and at the Equator never exceeded 30° centigrade, according to the second engineer. In looking over the engine-room and some adjoining rooms used as store-room and repair shop, I was surprised at the great number of spare parts carried along. However, hardly any of them had been used so far and upon enquiry, I was told that this was according to the German Lloyd's rules, and not any more than would be carried on a steamer.

As compared with the eight-cylinder four-cycle engines of the *Christian X*, these Sulzer two-cycle motors are a great improvement and certainly will prove to be a move in the right direction. The fine conditions prevailing in the engine-room after one year's service, cannot but advertise the product of Messrs. Sulzer Brothers. In obtaining the above data and information, Captain Lurs and First Officer Schulze, of the *Monte Penedo*, materially assisted me, and Chief Engineer H. Heinmann, and his assistant, were ever ready to answer any questions and were very free and open towards me in discussions on the merits of the engines.

RECORD WORK IN SHIPBUILDING.

One Firm's Thousandth Vessel.

AN interesting event in the history of the long-established and world-renowned shipbuilding firm of William Denny & Brothers, Dumbarton — believed, indeed, to be unique in the annals of shipbuilding—was the completion on Sept. 6th of their thousandth ship—or rather the ship—whose construction was undertaken by the firm and for the most part carried out within their shipyard. This note of qualification is due to the fact that many of the vessels comprised in the round number were only temporarily or half constructed in their shipyard, then dismantled, shipped abroad, and at their destination, or scene of actual service, re-erected, firmly bound together and launched as finished articles. A large number of barges, as well as steamers, for the Irrawaddy Flotilla Co., which were thus produced, are included in the proud record of "One thousand vessels," and numerous barges and steamers of light draught for Russia, South America, and other parts of the world are also part of the round achievement. One particularly memorable item of this character was the screw steamer *Coya*, despatched in pieces to the West Coast of South America and transported to Lake Titicaca, the highest navigable lake in the world, 30,000 ft. above sea level, in the wilds of Peru, and there thoroughly rebuilt, partly by native labour, and launched into service, which has been of untold importance in the development of the resources of that part of the world. These facts are referred to, not by any means with any view of belittling the achievement of which Messrs. Denny are justly proud, but purely in order to show the striking variety of the shipbuilding work done by a firm, whose reputation for notable ocean liners and high-speed Channel steamers, is simply co-equal with their claims and title to have long been in the van of progress as scientific designers and constructors of vessels for all services. The record of a thousand vessels applies to Messrs. William Denny & Bros. as shipbuilders from the year 1845, and to the associated firm of Messrs. Denny & Co. as engineers since 1850. Of the early history of both firms readers may be referred to the pages of our journal for March, 1909, where a lengthy notice, with illustrations, is given of the two firms and their productions, *apropos* of a souvenir historic record at that time issued to their friends.

The thousandth vessel, as it chanced, was a steamer for service on the Irrawaddy river—for which service, both as regards steamers and barges, Messrs. Denny & Brothers have practically all along had a monopoly—and in celebration of its completion in the yard the firm on Saturday, Sept. 6th, announced for the working forenoon a "stand-at-ease" order, presented to their 2,600 employés a copy of the highly artistic *brochure* "Souvenir of One Thousand Vessels," before referred to and paid wages to each individual at time rate, for the whole forenoon. Although now sixty-eight years ago, the older inhabitants of Dumbarton are recalling with pleasure, that they can remember Messrs. Denny's first launch, the paddle steamer *Loch Lomond*, ninety-five tons, with engines of seventy horse-power, and their third vessel, the *Water Witch*, of 240 tons, a screw steamer of thirty-five horse-power. The recollections of some of the workmen still in the employ of the firm go back to, and embrace, the first half-hundred contracts executed.

To such workman, especially, the variety and striking nature of the old firm's successes in the most up-to-date productions must be matter of admiration, if not wonderment. Submarines and even ariel ships are quite in the practical region of present-day activity at Leven shipyard. Several years ago the firm had its name placed on the Admiralty list of builders, and since that time they have sent out sixteen torpedo destroyers, some of which have been acknowledged the leading vessels of their class. For this department Messrs. Denny made a special extension of their launching berthage, and additions to their drawing offices, both at the shipyard and engine works. Entrusted by the Admiralty with boats of special design, they have built several to burn oil fuel, as well as constructing the hulls of the two first destroyers to be fitted with geared turbines. The warship department of the Leven shipyard is regarded as a side of the firm's activities which will expand, and in this connection there has been brought together a scientific staff to take up the design and building of submarines and what this species of war craft may lead to.

ENGINEERS' CERTIFICATES.

To the Editor of The Marine Engineer and Naval Architect.

Engineers' Scholastic and Practical Experiences.

Dear Sir,

As an engineer who values and has been valued for his marine certificate I have been awakened to a sense of responsibility by your article in the July issue under above heading. The new Board of Trade regulations which are to come into force in 1915 contain changes in the conditions of examination and service for marine certificates of such importance that it behoves all marine engineers to carefully consider them before they allow them to come into force without protest. I think it may be taken as granted that all engineers will agree with you that there is no equivalent substitute for the practical experience gained in the engine room. In the new regulations the period of service has been extended from twelve to eighteen months, and with the increase of machinery in modern ships, this extension of service is probably necessary, but the value of the extension is stultified by the fact that three months or less of this extended service may be satisfied by "regular and consistent attendance at an approved technical school." I for one desire to protest strongly against this optional substitution, not that I do not value technical school training (I was trained in one myself), but for several very solid reasons. In the first place I object to allowing any suggestion that time at a technical school or anywhere else can be an equivalent substitute for even a small part of sea service. If the B.O.T. consider that regular and consistent attendance at a technical school is necessary, let them embody that requirement in the regulations, so that the period of service is fifteen (or eighteen months') sea service *and* three months at a technical school. But let there be no optional substitution of school time for sea service or before long we will find that no sea service at all will be required. In the second place I am firmly convinced that the proposed technical school service will be useless, impracticable and unfair, useless, because the time, three months or less, is wholly inadequate for any substantial benefit to be derived from it. Impracticable and unfair because the system of technical school work cannot be made to work in with the requirements of sea-going engineers. Technical schools give their instruction in sessions usually beginning in September and running through the autumn and winter months. To obtain any real benefit an engineer should begin at the beginning of a session and go right through it. But a sea-going engineer cannot regulate his movements so that he can leave his ship just in time to begin this technical course, or if some are lucky enough to be

leaving a ship at a home port just as a session is opening it is rather unfair to their fellow engineers whose ships may at that time be several thousand miles away. To join a technical school in the middle of a course is worse than useless, as anyone acquainted with the system of teaching there will agree. Lastly is not the B. O. T. in these new regulations unnecessarily belittling both themselves and the marine engineer? Belittling themselves, because, since they have an examination that is supposed to search a candidate's technical education, the fact that three months' technical school attendance satisfies them, does not place these examinations very highly. Belittling the marine engineers, because about the only thing that could be learnt in three months or less at a technical school would be simple multiplication and division.

Yours, etc.,

London, 1st. Sept., 1913. A. M. Inst. C. E. and Extra Chief.

To the Editor of The Marine Engineer and Naval Architect.

Dear Sir,

Having read with great interest in your September issue a letter signed "Chief Engineer," I obtained a copy of your July number with a view of reading your article upon the New Regulations for the Examination of Marine Engineers which are to come into force in 1915. I must confess that before that, I had given the matter very little thought, but "Chief Engineer's" letter and your article tempted me to purchase a copy of the Regulations on the subject, and I must confess myself shocked and surprised. Shocked when I realize the effect such regulations will have upon the value of the Marine Engineers Certificate, one of which I hold, and which I value, and surprised to think that such a short-sighted policy should be pursued by those in authority in the Board of Trade, who, by the way are themselves Certificated Marine Engineers, and to whom such regulations must be submitted. It is that clause which allows "alternate attendance at an approved school to be substituted for sea service" to which I refer. Surely the Board of Trade do not for one moment propose that time spent in a Board School is to be substituted for sea experience, even if that school has, with more or less success, filled the bill for day and evening classes for apprentices and the like. It is a well-known and acknowledged fact that the Certificated Marine Engineer's chief asset in the eyes of the world at large, is that practical experience, which is necessary to qualify him for his Examination (and, which it should be specially noted, he obtains after reaching manhoods estate), but if that service is to be placed in the balance (in part or whole) with a Board School attendance qualification it is very doubtful indeed whether that status, which he now enjoys, will be maintained and whether the tendency will not be to lower it from the present position of a practical professional man, to that of a certificated driver.

The action of the Admiralty when they abolished the Engineers Officers' Reserve, and substituted their present scheme, was a severe blow to marine engineers, and one which should not have been left so long without action; but these regulations are more serious, and I sincerely trust that your timely and able article may induce those in direct authority to reconsider the standing regulation, and to realize that the questionable good it is evidently intended to do to the few, is too dearly bought. I am one who strongly maintains that "there can be no substitute for Sea Service."

Yours truly,

W. R.

London, September 23rd, 1913.

Candidates for 2nd-Class B. O. T. Certificates.—An enlarged list of technical colleges and schools, attendance at which for a prescribed period and compliance with certain conditions may be accepted in lieu of a portion of the workshop service for the 2nd-class engineers' certificate, has been issued by the Board of Trade for the guidance of candidates. The list embraces a large area and includes a wide variety, from the local technical school to the University, so that the standard varies considerably according to the circumstances of the candidate in respect to general education and situation. Attendance after the age of fifteen at evening classes will be accepted as equivalent to workshop service, five hours in the classes being reckoned as equivalent to one day, and two-thirds of the number of days so obtained counting as workshop service. Candidates who have been employed in the workshop during the day and have attended classes in the evening, must produce evidence that the service in the workshop has been on full time, if they desire to have the class attendance counted. The day classes attended must be in mechanical engineering and the Principal's certificate for continuous and regular attendance at all the approved classes with satisfactory progress must be produced. In addition to such certificate, the number of hours must be specified showing attendance at the evening classes.

MESSRS. CRAIG, TAYLOR & CO., LTD.

On September 5th, the officials, foremen and a large number of the workmen in the employ of Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, assembled in the drawing office of the Company to make a presentation to Alderman and Mrs. Herbert Taylor on the occasion of their silver wedding. The chair was taken by Mr. George B. Craig (yard manager), and Councillor John Farthing (secretary), in making the presentation, which consisted of a very handsome solid silver tea and coffee service, salver and pretty flower vase, mentioned that during the twenty-five years which he had been connected with the firm in which he had been in almost daily contact with Alderman Taylor, he had had ample opportunities of knowing that gentleman's sterling qualities. To know Alderman and Mrs. Taylor was to respect and admire them. There had been many testimonials connected with the yard, but never had one been more readily or heartily reponded to than this one. Since the lamentable death of Alderman Craig, nearly eight years ago, the entire responsibility of securing orders to keep the yard going had fallen upon the shoulders of Alderman Taylor, and that he had been thoroughly successful in these onerous duties was amply demonstrated by the continuity of work which they had always enjoyed. It was a difficult task to get shipbuilding orders, as not only was it necessary to prove by low prices that they were able to turn out the best possible ship at the lowest price, but tact and generalship in persuading owners to entrust their orders with you was sometimes more important. That they had an excellent general in Alderman Taylor at the head of affairs was proved by the fact that when orders were being placed, Messrs. Craig, Taylor & Co., Ltd., generally got a share of what was going. In Mrs. Taylor, Alderman Taylor had an excellent partner, who took the keenest possible interest in the business of the yard. He was quite sure that he echoed the feelings of all present when he tendered Alderman and Mrs. Taylor their sincerest congratulations on their silver wedding, wishing them the best of health and every happiness. Mr. C. W. Anderson, jun. (chief draughtsman), Mr. William Coutts (foreman blacksmith), who had been in the yard from the commencement, on behalf of the foremen, and Mr. McGregor (plater) on behalf of the workmen, all endorsed the remarks of Councillor Farthing, after which Alderman Taylor feelingly responded, and incidentally mentioned that he was pleased to find employés there who had been with him since the opening of the yard thirty years ago.

INSTITUTE OF MARINE ENGINEERS.

The transactions of The Institute of Marine Engineers for session 1912-13, comprising the papers read during the presidency of Mr. Summers Hunter, when bound, form a handsome volume containing valuable and interesting reading. This is the twenty-fourth annual volume of transactions and the subjects dealt with are as follows:—Assam and East Bengal; The towing machine; Notes on a marine engine; Modern developments in the electro-deposition of metals; Wave motion and modern developments in high frequency electricity; Applied stability of ships; The manufacture of iron; The uses of gases for fire extinguishing and fumigation of ships; The lessons of collisions at sea and some suggestions; The spontaneous combustion of coal. There is also the memorial booklet containing the portraits of the engineers of the *Titanic* and the names of the steamers from which

The Institute of Marine Engineers.
New premises in course of erection, Tower Hill.
Architect, Victor Wilkins.

contributions were received for the memorial benevolent fund, and a list of contributions from all parts of the world. The members are to be congratulated on the variety and general excellence of the papers submitted for their edification by those whose experience and research enables them to write and speak on what they have been in close touch with. The subjects are illustrated to an extent which enhances the value of the papers and brings the details home to the reader. Besides the papers mentioned, the volume contains many interesting details in connection with the marine engineering world.

The new premises in course of erection near Tower Hill are now beginning to show in foundation outline, and it is announced that the foundation stone is to be laid by The Lord Mayor of London, accompanied by the Sheriffs in state, on October 29th, when it is expected that there will be a large and representative gathering of those who are interested in marine engineering. The building fund has been added to considerably by donations received during the past two months, especially in view of the ground having been broken and the foundation being prepared for the coming ceremony. The total amount recently announced was stated to be approaching £7,600. The annual dinner of the Institute will be held on November 21st., in the Grand Hall, Hotel Cecil, Strand. The Presidential Address will be delivered on November 3rd by Mr. Thomas L. Devitt.

BOOK AND CATALOGUE NOTICES.

A Primer of the Internal Combustion Engine. By H. E. Wimperis M.A. London: Constable & Co., Ltd., 1912. Price, 2/6.

This little volume, though called a primer, is to our mind a very good epitome of the whole subject, treated both from practical and scientific standpoints. In the 130 odd pages it contains it is difficult to say anything has been left out that one would expect to find. There is first of all a short history of events that led up to present-day developments. Then we have the necessary theory as the basis of practice and after what an ideal engine should be, we come to the real examples, finishing up with a description of the fuels, engine details and tests. Throughout the volume there is a full measure of sketches in illustration and sections of gas and motor car engines. These illustrations are all interspersed among the reading matter and therefore ready to hand. In a branch of engineering like this, gases and vapours have to be discussed closely and the author does this effectively. The indicator used is the one readers are familiar with in steam practice and the diagrams also are not unlike. Differences will be observed and it is the purpose of a volume of this kind to elucidate them, and we feel sure it will repay readers to closely study what they see here if they desire to be up to date. We not only find the ordinary gas engines, but the Diesel type fully explained and the mechanism pertaining thereto. The turning movement at crankshaft is clearly shown for various designs of engines and in the chapter on fuels there is a suction gas plant diagram. The engine details are perhaps as important a section as any here, all the ignition devices being fully described. Examples are set with each chapter and the answers given at the end. In conclusion we congratulate the author upon the excellence of his work.

Leeds Chamber of Commerce Year Book.—The enterprise of the Leeds Chamber of Commerce is evidenced by the issue of this interesting volume. There are records which show that a Chamber was formed in 1785 for the purpose of dealing with the trade and commerce of the district. The Chamber, as now constituted, has exercised a beneficent work and supervision since the year 1850. The traders of Leeds are well served with both railway and canal transport facilities, and the Chamber has shown itself alive to the advantages of both, endeavouring to encourage the proprietors of the latter to improve and keep up-to-date with their arrangements for furthering the object of waterway traffic. The city of Leeds covers an area approximating to a circumference of thirty-eight miles, with a population of about 500,000, and a property rateable value of £2,189,013. The vicinity of the Yorkshire coalfields and the agricultural areas around, marked the importance of the centre many years ago, and the rapid development of the woollen and iron industries added to by cognate manufactures have earned for Leeds the designation of the commercial metropolis of Yorkshire. It is stated that in the first Royal charter granted by Charles I., in 1626, "the inhabitants for many years skilfully exercised the art or mystery of making and working woollen cloths, commonly called in England 'Northern dosens,' to the perpetual praise and great increase of the revenue to the Crown of England for the custom of the same cloths." To the Flemish weavers who settled in the country was due the progress made in the direction referred to in the charter. The educational facilities, the training college and the University are all well advanced in respect to buildings and teaching staff. Students from the Continent, Australia and the Far East have come to cherish the University as their alma mater. Under the heading of inland water communication, emphasis is laid upon the excellent services rendered by the canals, and special mention is made of the enterprise of the Aire and Calder navigation in keeping the inter-communication up to the requirements and maintaining the canals. The blast furnaces, steel works and forges do a large trade and the recently discovered process of rolling manganese steel rails was dealt with in Leeds. The many different kinds of machinery and of manufacture dealt with are enumerated in the Year Book—which is extremely interesting—and show how wide a field of enterprise is embraced within the area of the city bounds. Several pages are devoted to Imperial and foreign trade, giving information of a valuable kind to traders, agents and manufacturers in connection with regulations and tariffs in the different countries of the world. There is a directory of manufacturing firms included and the same volume contains the information regarding the manufactures and industries in French and Spanish in addition to the English.

Messrs. Ronald Trist & Co., Ltd.—This enterprising go-ahead firm have just published one of the most striking handbooks on their well-known "Thermo Feed" arrangement that we have had the opportunity of perusing up to the present. Not only are the general illustrations extremely clear and beautifully done, but included is a

coloured folder inset of an entirely novel character, marking a distinct departure in descriptive catalogue work. This inset has been prepared on the usual map colouring principle for a rapid explanation of constructional details, by reason of the fact, that no contiguous parts are shown in the same colour, consequently each part is distinctly defined. This apparatus, has, we understand, caught on to a remarkable extent, in some cases after trial no less than fifty machines have been ordered at a time for batteries of boilers, the beneficial result of maintaining the water level with a maximum variation of ½-inch having been proved by demonstration.

Messrs. Smith, Major & Stevens, Ltd.—We have received a copy of the 1913 handbook on electric lifts, published by this firm containing 100 pages of matter profusely illustrated. It is of particular interest to those associated with marine work, having regard to the extended use of lifts on board ship, not only on passenger ships, but also on naval vessels. It is interesting to note that in view of the claims made by the firm for simplicity of design, small number of parts, directness of action, accuracy of stopping level, sound construction and general freedom from breakdown, the Admiralty, after some years of trial in battleships of the super-Dreadnought type, have entrusted the firm with the whole of the automatic lifts for this year's naval programme. Shipping companies which have had lifts fitted by this firm include the Atlantic Transport, Cunard and Orient Steam Navigation Co. The illustrations in the handbook not, only exhibit works of high artistic merit, but at the same time machinery of high-class design and sound construction.

The Progress of Warship Engineering.—We have received a pamphlet under the above title, which is a reprint of a section written by Charles De Grave Sells, M.I.C.E., of the 1913 edition of Janes "Fighting Ships." This section deals with steam turbine construction, geared turbines, the Gary-Cumming's torsion meter, water testing by electricity, steam generators, air supply to boilers, steam-tight valves, valve reseating machines, ash expeller, motor ships, the Junker's engine, the Bolinders engine, motor gunboats, resistance to airship attack, hydro aviation, underwater attack, submarine attack, the Davis' gun torpedo, submarine motor ships and submarine salvage. A variety of subjects of the greatest possible interest as showing the development in matters of the most vital importance to us as a nation, both as to what we can do for ourselves and what others can do to us. We are sure this year's publication will be read with as great if not greater interest than its predecessors.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Lost Time in Shipyards.—The question of lost time on the part of the "black squad" in shipyards, not only on the Clyde, but in all federated districts, has become more acute since the recent wages settlement. This is aggravated in many cases of delayed delivery of new vessels, and pressing jobs of ships under repair, by the refusal of workmen to resume overtime to any extent, although it was a condition to the wages settlement that they should do so. Added to the trouble arising out of this state of things have been the numerous stoppages due to disputes between the holders-up and the riveters regarding the division of squad earnings, in respect especially of the 2½ per cent. advance. After a prolonged conference between the Executive Board of the Shipbuilding Employers' Federation and the officials of the Boilermakers' Society, held in Edinburgh on September 10th, the officials undertook to do everything in their power to see that a reasonable amount of overtime is worked and that more regular hours are observed. An interval of six or eight weeks will be allowed to elapse before any further steps are taken. If there is a satisfactory improvement during the interval the object the employers have in view will be achieved and it will be unnecessary to do anything further. The Clyde District Committee of the Boilermakers' Society have circularized the members on the subject, and the employers on their part are most anxious that everything should be done to expedite the completion of work on hand, much of which is already overdue. It would seem to be the idea of many of the workmen to spin out existing contracts as much as possible, overlooking the fact that in pursuing this policy they are preventing possible new orders being placed with their employers. Unless berths are available new keels cannot be laid down and work is diverted or permanently withheld.

Launches.—Although the foregoing describes the general state of things there is still a fair degree of activity in launching new vessels. On September 4th, for example, four new vessels were launched from Clyde yards. Messrs. Barclay, Curle & Co., Whitinch, launched the 11,400-ton Union Castle line *Llandovery Castle*; Messrs. Mackie & Thomson (Messrs. Harland & Wolff) an Atlantic Transport liner of 5,000 tons; Messrs. Charles Connell & Co., a Clan liner of 5,070 tons, and Messrs. Murdoch & Murray, Port Glasgow an Anchor Line passenger tender.

Messrs. A. & J. Inglis, of Pointhouse Shipyard, have now fitted out for their voyage to Madras the geared turbines *Hardinge* and *Elgin* the second and third of the three large ferry steamers which they have built and engined for the South Indian Railway Company's service between Madras and Ceylon. The first of the trio, the *Curzon*, was despatched on her voyage to the East some time ago. The propelling machinery on board consists of Parsons geared turbines of about 2,200 total S.H.P. driving twin screws and supplied with steam from two water-tube boilers of the Yarrow type.

Messrs. David Rowan & Co., engineers, Elliot Street, Glasgow, are installing in their extensive works plant for the manufacture of marine steam turbines, and also plant for the cutting of mechanical reducing gear on the Parsons system. The firm will be the first engineering firm in the United Kingdom apart from the Parsons Marine Steam Turbine Co. at Wallsend, to engage in the cutting of helical reducing gear for adapting high-running turbines to slow-running propellers. The Fairfield Shipbuilding and Engineering Co., Govan, it is understood, are also installing gear-cutting plant.

Messrs. Alex. Stephen & Sons, Ltd., of Linthouse Shipyard, Govan, launched, on September 16th, a large cargo steamer, for the Clan Line, Glasgow. The first Clan liner built by Messrs. Stephen was the *Clan Alpine* launched in September, thirty-five years ago, and this interesting fact was alluded to at the launch of the new vessel. Another vessel for The Clan Line, was launched by Messrs. Charles Connell & Co., Scotstoun, on September 4th. This was the *Clan Maccorquodale*, which will be engined by Messrs. Dunsmuir and Jackson, Govan. A notable production of the Linthouse firm, which is now drawing near completion at the Shieldhall Wharf, west of the shipyard, is the twin-screw mail and passenger steamer *Gelria*, which the firm launched about two months ago to the order of the Royal Holland Lloyd, Amsterdam. In respect of internal equipment this vessel is one of the most up-to-date and handsome that has ever been produced on the Clyde.

Messrs. Barclay, Curle & Co., Ltd., of Whiteinch and Elderslie shipyards, in association with the North British Diesel Engine Works, are now busy organizing and building the new premises in which Diesel engines will be manufactured. The site of the works is at Scotstoun, a little to the east of Messrs. Yarrow & Co's establishment. Mr. Randolph C. Smith who was till recently engineering manager to Messrs. Barclay, Curle & Co., Ltd., has been appointed general manager of the new Diesel engine works. While he was with the firm in the above capacity he had most to do with the oil engines made and fitted to the large oil-engined vessel *Jutlandia*. In connection with the new works there will be a fitting-out basin constructed parallel to the river. Practically this will take the form of a recess 110 ft. back from the line of the river bank and some 900 ft. in length, or of sufficient length at least to accommodate the largest vessels likely to be propelled by oil engines for a considerable period. In room of Mr. Randolph C. Smith, Mr. Archibald Gilchrist, son of Mr. James Gilchrist, the well-known principal of Messrs. Barclay, Curle & Co., will now hold the post of engineering manager.

Messrs. William Simons & Co., Ltd., Renfrew, from whose stocks during the month of September three further vessels—dredger and barges—of the fleet they have on hand to Russian account were launched, have been commissioned by the Tongkah Harbour and Tin Dredging Company to construct

a dredger somewhat similar in design to, but more powerful than "No. 4" and "No. 5," which the firm have already built for the company.

Messrs. Fleming & Ferguson, Paisley, have been, and continue, busy on dredging plant for various parts of the world, and about mid-month products of their stocks, in the shape of two barges, a dredger and a tug steamer, were all being tried at one time on the Firth of Clyde. They have all been built to the order and under the supervision of the Crown Agents for the Colonies, and are intended for service in West African waters.

Messrs. John Brown & Co., Ltd., Clydebank, who have on hand two fine twin-screw passenger and cargo steamers for the Russian Steam Navigation and Trading Company, Odessa, took the first of these, the *Emperor Peter the Great*, down the Firth of Clyde on trial on September 19th, and on the following day launched the sister ship and moored her in their fitting-out basin. The two vessels are each about 5,800 tons and are similar to two steamers for the same owners and service building by Messrs. Denny & Bros., Dumbarton, as afterwards referred to.

Messrs. William Denny & Brothers, of Leven Shipyard, Dumbarton, have recently received from Messrs. P. Henderson and Co., Glasgow, the order for a new steamer intended for their Glasgow and Liverpool to Rangoon service. The new vessel will be somewhat larger than the *Pegu*—the last steamer built by Messrs. Denny for the same owners—and she is intended to be delivered early in the autumn of next year. It is of interest to note that the Dumbarton firm have for a very lengthened period constructed one steamer per year for Messrs. P. Henderson & Co. The *Pegu* above referred to was the thirty-second vessel which the Dumbarton firm have built for Messrs. Henderson as managers of the British and Burmese Steam Navigation Co. The firm was first instructed with an order from Messrs. Henderson forty-two years ago.

Messrs. Denny & Bros. intend launching before the end of September, or early in October, the second of the large twin-screw steamers they have on hand to the order of the Russian Steam Navigation and Trading Co., Odessa, the first of which —the *Empress Ekaterina*—was launched on July 7th last. The vessels, which are sister ships to the pair of steamers building for the same Company by Messrs. John Brown and Co., Ltd., Clydebank, are of about 5,800 tons, and all are for the passenger and cargo trade between Odessa and Alexandria.

A noteworthy event in the recent annals of the Dumbarton firm was the launch of their *thousandth* vessel, and as this was marked by some ceremony and evoked interesting reminiscences, fuller reference is made to the subject elsewhere.

The Dumbarton Weldless Tube Co., whose works at Knoxland, in the eastern district of Dumbarton, is a portion of the extensive premises laid down and projected a number of years ago by Kosmoid Limited, are about to add very extensively to their tube-making plant, and contemplate also starting shortly the construction of moderately sized internal-combustion oil engines. This information was communicated to the audience at the recent formal opening of New Church Halls at Knoxland by Mr. James Denny, the managing director of the well-known engineering firm of Messrs. Denny and Co., Dumbarton, who at the same time stated that it was a very open secret that the Dumbarton Weldless Tube Company was really a branch of Messrs. Babcock and Wilcox, the great Renfrew boilermaking firm.

Messrs. Dunlop Bremner & Co., Port Glasgow, have received from Messrs. H. E. Moss & Co., Liverpool and London, acting on behalf of the Santa Clara Steamship Company, an order for two screw steamers, each of about 3,400 tons deadweight.

The Montrose Shipbuilding Company have received an order to build two steamers, each 150 ft. in length, 25 ft. in breadth and 12 ft. in depth for Liverpool owners. The vessels are to be classed by the British Corporation Registry of Shipping.

New Dock Works at Leith.—Having regard to existing shipbuilding interests, and the provision of improved facilities for building and launching ships, the Leith Dock Commission have agreed that plans and approximate estimates of cost shall be prepared and submitted by the consulting engineers —Sir A. M. Rendell and Mr. C. S. Meik—in co-operation with Mr. Roberts, the new dock engineer and superintendent. These will be alternative to the various plans prepared by Mr. Peter Whyte, C.E., now retired, having in view the possible developments and more general extensions for which the Commissioners recently received parliamentary powers. The plans Mr. Roberts is authorised to prepare will show how the future development of the harbour and docks may be carried out by degrees, and with special regard to improving and extending the existing shipbuilding facilities.

Dundee a Naval Seaplane Station.—Dundee as a naval centre promises to assume more and more importance. To its distinction as a base for submarines there is now to be added that of a seaplane station, in pursuance of the Admiralty's scheme of gradually constructing a cordon of naval air stations round the coast from Southampton to Cromarty, as adjuncts to the dockyards and other naval bases on the Channel and North Sea. The facilities afforded in the estuary of the Tay for seaplane manœuvring have been carefully discussed between a committee of Dundee Harbour Board and representatives of the seaplane branch of the naval service, and it is believed that the result will in all likelihood be that Dundee will shortly be selected by the Admiralty as a permanent station for seaplanes and become the principal centre of its kind in Scotland. In all probability, within six months a seaplane station will be equipped at the east end of the harbour, and industrially this will cause considerable developments, especially if, as is believed, the manufacture of engines for the seaplanes will ultimately become part of the operations at Dundee.

TEES AND THE HARTLEPOOLS.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, continue to be very busy with work on hand. They are reported as having secured the contract to build a fine cargo steamer for London owners and are expecting to secure a contract for Liverpool owners that is in the market.

Messrs. W. Harkess & Co., Ltd., are reported to have secured the contract to build a medium-sized steamer for delivery next year.

Messrs. Smiths Dry Dock Co. have a very large amount of new work on hand, besides altering and repairing several steamers, dry docking, etc. Great progress is being made with their extensions to the shops.

Messrs. Richardsons, Westgarth & Co., Ltd., are busy in nearly all departments, although the foundry is closed. Extensions are going on in the heavy stampings departments to enable them to cope with the increase of orders. They have an order for four very heavy forced draught marine type boilers for a twin screw steamer for a Liverpool firm.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. are reported to have secured the contract to build a medium-sized cargo steamer for early delivery.

Messrs. Graig, Taylor & Co. are expecting a repeat order for a cargo steamer which will keep them busy well into next year.

Messrs. R. Ropner & Sons have a large amount of work on hand; they are reported to have secured the contract to build a medium sized cargo steamer for foreign account. They will be fully occupied well up to Easter next year.

Messrs. Blair & Co. have a large amount of work on hand for steamers building principally on the Tees and Wear, which will keep them employed up to the middle of next year.

West Hartlepool.

Messrs. Furness, Withy & Co. have sold the s.s. *Westhampton* to Messrs. J. Gaff & Co., Glasgow, for about £24,500. They are selling six steamers to a Russian Syndicate under the title of the West Coast Navigation Co. the s.s. *Snowden Range*, 3,060 gross tons, *Grampian Range* 3,148 tons and *Fellbrook* have been taken over, They have also sold the s.s. *Castle Eden*, 1,844 gross tons to the Kelvin S.S. Co. (Hugh Hogarth & Co.), Glasgow, for £24,000, who have rechristened her the s.s. *Baron Blaintyre*, and the s.s. *Tudhoe* 1,298 gross tons to Swedish owners. They have placed six orders for steamers recently, two of about 3,400 deadweight on the arch principle. Ayre Ballard patent, with Messrs. Osborne, Graham & Co., Sunderland, one with the North of Ireland S. B. Co., Londonderry and two with Messrs. Irvine's Shipbuilding and Dry Dock Co., Hartlepool. Messrs. T. Appleby and Co. have sold the s.s. *Maude* 3,254 gross tons, and Messrs.

R. Livingston & Co. have sold the s.s. *Buckminster* 2,025 gross tons to Messrs. Sale & Co., London, for about £10,500.

Messrs. W. Gray & Co., Ltd. continue very busy and have recently sold a cargo steamer they are building, of about 4,800 tons deadweight, to Messrs. Strick & Co., London, for nearly £40,000. They have also booked an order for a cargo steamer for the Ellerman Line and have a very extensive repairing job on hand, the s.s. *Orpheus*, belonging to Messrs. Jennison, Taylor & Co., Sunderland ; all her machinery will have to come out excepting the boilers ; her size is such that her rudder had to be taken off to get her into dock. The repairs will take about three months.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Harbour Dockyard, are very busy on both new and old work. The dry dock is kept so busy that the new work has to be delayed in consequence.

The Central Marine Engine Works of Messrs. W. Gray & Co. are very busy in every department, having all the engines and boilers to make for the ships building at both the old and new yards. They are also very busy in the stamping department and auxiliaries. Their Cmew pumps are greatly in demand.

Hartlepool.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Middleton Yard, have two steamers in hand for Messrs. Furness, Withy and Co., for delivery about next Easter. Great inconvenience is experienced on account of the shortage of men.

Messrs. Richardsons, Westgarth & Co., Ltd., have a large amount of work on hand and have been much hindered by the shipyards and trade disturbances. They have booked the order to supply the engines and boilers for the steamers to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co. They also have a large amount of Contraflo condenser work in progress which will keep them busy up to about Easter.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Lord Nunburnholme Statue Unveiled.—On September 11th, Earl Brassey unveiled the statue of the late Lord Nunburnholme, better known in his own city as Mr. Charles Wilson. The statue is erected in the square, facing the new Town Hall being built for the Hull Corporation, on the site of the old Town Hall, and facing the new General Post Office. The memorial represents Lord Nunburnholme dressed in his peer's robes and is a credit to the sculptor, Mr. Derwent Wood. The inscription reads as follows :—" Charles Henry Wilson, First Baron Nunburnholme. Born 1833, died 1907. Thirty-two years a Member of Purliament for Hull and a great benefactor to the city. Erected by public subscription." The chairman of the statue committee was Alderman H. Feldman, J.P.

New Hull Joint Dock.—This new dock is nearing completion, and water was let into it recently ; of course this has to be done gradually. It is being constructed at the joint expense of the North Eastern and Hull and Barnsley Railway Companies and with equipment will cost £2,000,000. The dock is vast, and it is necessary to inspect the undertaking before its size can be appreciated. Dock construction is not "showy" work; there is comparatively little to see now, save the water and the quays. Had it not been for the decision to make an additional south-east area (which had been reserved on the original plan) and two new graving docks, the undertaking would have been opened for traffic by now. The delay, under the circumstances, could not be possibly avoided. With its present water area of 54 acres, the dock will be the finest, largest, most up-to-date dock on the East Coast. The total length of the quay is 8,162 lineal feet, and the equipment will comprise the latest appliances for the rapid handling of traffic ; the net-work of railway-sidings has practically been completed, and good progress has been made with the erection of grain-silos, providing for the storage of 60,000 tons of wheat. There are to be six coal conveyors, and numerous up-to-date cranes and other machinery. The lock-pit has a length of 750 feet and a minimum depth at H.W.O.S.T. of 37 feet of water on the inner sill. The dock has been constructed by Messrs. S. Pearson & Son. The opening date has not yet been announced, but it is expected generally that ships will enter before this year is out.

Humber Coal Workers.—Hull, Grimsby and Goole. The coal trimmers and tippers at the three ports of the Humber ceased work on 20th September at 1 p.m. in accordance with the national movement to which they are parties, in consequence several vessels were held up for the week end. Three vessels have also been delayed at Immingham Docks. The coal tippers and trimmers of the country have held two conferences at Birmingham on the question of the Saturday half-holiday, and the upshot of the second conference was, a resolution passed that work shall cease at 1 p.m. on Saturdays. The men at Hull also left their work quietly at 1 p.m. There was no demonstration of any kind and all the passenger week-end steamers sailed as usual.

P. & O. Australian steamer s.s."Benalla."—The *Benalla*, said to be the largest steamer to enter the Hull docks, has been berthed in the Alexandra Dock, with a cargo comprising the following for Hull, 25,509 bags of wheat, 999 crates of rabbits, and 300 carcases of mutton from Sydney. 2,051 crates of rabbits from Melbourne, and 131 bales of wool from Adelaide. She carries the latest type of freezing apparatus, and also special chambers for the carriage of fruit and fish. It is hoped when the new joint-dock is open that many steamers larger even than the *Benalla* will be berthed in it.

Grimsby.—The crews (firemen and seamen) of the Great Central Railway Co.'s steamers are having a dispute in their working arrangements, but it is hoped that the good offices of the Company's genial manager, Sir Sam Fay, will be able to prevent the men from striking. The sailings up to writing have not been disturbed. Sir Sam Fay will meet the officials of the Men's Union at the Company's London office.

Messrs. Amos & Smith, engineers, etc., have during the month booked several orders for boilers and machinery for new trawlers building in the Humber ports (local yards) for forward delivery, the works are kept fully employed in all departments, the branch works, situated at Alexandra Dock are kept well employed with graving dock work and engine repairs and opening out for Lloyd's and B. C. surveys. The outside staff of the Albert Dock engine works are also fully employed on repair work, and fixing boilers and machinery on trawlers, etc., and finishing up for trial trips. The firm are well booked up with orders into next year.

Messrs. Cooper & Co., Ltd., engineers, etc., Neptune Engine Works, have had a fair amount of graving dock repairs and boilers and machinery opening out for Lloyd's surveys. The moulders' shop has had a fairly good month. Several orders for the Company's patent propeller have been received. The branch shop at Alexandra dock is fully employed with repair work, and graving dock work ; the Company's own graving dock has been well booked up, and prospects seem good for the firm.

Messrs. North-East Coast Engineering Works (Hull), Ltd. and Ship Repairers have had a fair amount of general repair work on the following steamers : R.M.S.P. *Tamar*, extensive repairs to ship and engines, also in graving dock, tail shaft drawn, new tail shaft and propeller fitted, main boilers and new stays fitted, etc ; s.s. *Corsican Prince*, extensive repairs to ship and machinery and main boilers, renewing stays, etc., also repairs, etc., on s.s. *Hawthorn*, s.s. *Owan Tudor*, s.s. *Fox*, s.s. *Lears Kruse*. A number of enquiries have been received from owners who have steamers coming to Hull.

Messrs. Stewart & Craig, engineers, etc., have had a fair amount of work during the month on several local and foreign steamers : s.s. *Queenie* opened out boiler and engines, etc., put through Lloyd's No. 2 survey, also bow damage repairs ; s.s. *Ravelstone* put into graving dock, also had general repairs done ; s.s. *Gravel Park* put in graving dock, fitted new propeller and other repairs executed. Several enquiries have also been received.

Messrs. Earles' Shipbuilding and Engineering Co., Ltd., are very busy building several large steamers for local and foreign owners, the Company's patent slips are kept fully employed for sighting purposes, painting, etc., the engine and boiler works department are at full pressure, and the outside repairing staff are kept fully employed. Prospects seem fairly good for October, as the firm have a number of enquiries for new ships to build.

Messrs. Woodall & Co., engineers, have been exceedingly busy with repairs on several steamers in the docks, the smith's shop is also full employed with small forgings, such as stems

and stern frames for several small ship-yards in different parts, also with forgings for the London County Council and Hull Corporation.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are still booking orders for trawlers, coasters, etc., and have work to carry them well into next year, on new trawlers for French, Irish, Hull and Grimsby owners. Several boats are now fitting out in Queen's Dock, Hull, with machinery, etc., some nearly finished ready to proceed on trial-trip, before handing over to the owners. The engines in most cases are supplied by Messrs. Amos & Smith, Ltd., and Messrs. C. D. Holmes, Ltd

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. John I. Thornycroft & Co., Ltd., Southampton.—H. M. torpedo boat destroyers *Paragon*, *Porpoise*, and *Unity*, have all been launched, and the *Paragon* will shortly proceed on her trials. The firm have completed the *St. Patrick*, a passenger and cargo steamer for Trinidad, and the vessel is now nearing her destination. Two lightships have also been delivered for Trinity House. Other deliveries include several motor boats for the British Admiralty and a number of minor orders. The work on Canadian Customs cruiser *Margaret* continues to make good progress. Amongst the orders received for new construction are two destroyers for the British Admiralty, two powerful ocean-going tugs for the Argentine Navy, and a large number of Thornycroft water-tube boilers complete with their patent oil burning apparatus. A considerable number of general engineering jobs have been carried out during the past month, and the repairs department has, as usual, been well occupied.

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton.—This firm laid the keel for a coastguard cruiser some time ago, and a large quantity of steel has been worked during the past month in connection with this vessel. An order has been booked for two small coastal steamers for The Royal Mail Steam Packet Company's West Indian service. The firm are also busy with two lock gates for Portsmouth Dockyard. The instructional turret for Devonport Dockyard has been delivered on site, and the work is nearing completion. The iron foundry is very busy, and a large number of castings were turned out last month for various engine builders, including a special set of condenser castings for Messrs. Hawthorn, Leslie & Co., Newcastle-on-Tyne. The S.Y. *Ilex* completed survey, and Mr. A. Brassey's *Czarina* is at the yard for a complete overhaul. Mr. Anthony Drexel's *Sayonara* will also be taken in hand for extensive alterations. Both the firm's slips are fully booked ahead for repair work. The paddle boat *Harlequin* has been completed for the Admiralty and the *Pilot* was handed over in August.

Southampton.—On the 13th of last month the *Andes* arrived from Messrs. Harland & Wolff's Belfast yard, and sailed on her maiden voyage in the R.M.S.P. Co.'s (accelerated) Brazil and River Plate service on the 26th. She is the latest and largest of the "A" class steamers, having a length of 570 ft. and a beam of 67 ft., with a gross tonnage of 15,620 tons. A description of the vessel was given in the June issue of this journal.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Last month the second of the 70-ft. motor hospital launches ordered by the Admiralty was delivered to Devonport. The vessel met with rough weather outside the Needles, but completed the run to Devonport in twelve hours. The Chilian destroyers *Almirante Lynch* and *Almirante Condell* (30,000 i.h.p.) have successfully passed their gun and torpedo trials. Two further vessels of this class are on the stocks, and their hulls and machinery are well advanced. H.M.S. *Redgauntlet*, torpedo boat destroyer, has been running her trials, and a sister vessel, H.M.S. *Rosalind*, will shortly be launched. Several small launches and pinnaces have been delivered, and the engine works are running full on various contracts. Highly successful trials have been made with a hydro-aeroplane constructed by the firm to their own special designs.

THAMES.

(*From our Own Correspondent.*)

Shipping and the Panama Canal. According to recent statements from America, San Francisco is to be the base of the Royal Mail S.S. Co. on the Western Coast of the continent *via* the Panama Canal, and for this service nine new steamers are in course of construction, in this country, the expectation being that they will all be ready for delivery in the autumn of next year. The vessels are to have extensive accommodation for passengers and be thoroughly modern in every respect and it is expected that the new route will compete successfully with that *via* New York. This direct sea service to San Francisco is a significant one and it is obvious the Company's present service on the West Coast will be largely developed by the opening of the Canal, Panama being a sort of junction for the various express services to South America.

By the sailing of the *Arbanza*, the Royal Mail Company has inaugurated its new express direct service to South America decided on some time ago. The quickening of the passage is experimental. While at present the voyage takes twenty-two days by omitting the calls at several ports *en route*, Buenos Ayres will be reached in eighteen days. On the homeward trip four days will also be saved. The voyage as regards fuel carrying will be seen to be a different one from crossing the Atlantic direct to New York, and therefore the question of higher speed of any new steamers for this route is an important one, owing to the length of the voyage.

London Shipping.—Amongst new tonnage for London owners we notice the *Llanstephan Castle*, 11,500 tons, built for the Union Castle line by the Fairfield Shipbuilding Co. The two Eastern Trading Co.'s, the P. & O. and British India, who maintain the trooping arrangements for the Indian service, have started their vessels for the season. These ships lie up at Southampton while not engaged trooping, the Government however chartering them afresh every season. When idle the six vessels lie in a line near Netley and form a very picturesque group there.

The Thames Ironworks Company.—The last of this Company has unfortunately come about, the plant and effects having been disposed of by order of the court, it being the largest compulsory sale on record in the engineering or shipbuilding trade. Twelve days were allotted to dispose of the 3,648 lots which comprised the property of the firm and it was expected that £67,000 would be the amount realized. Buyers, represented home and foreign engineering and shipbuilding firms, and keen prices were realised, the lots comprising tools, motors and uncompleted ships on the stocks.

The Baltic Chairman's Death.—A well-known figure in the City has passed away in the person of Major W. Bridges Webb, the Chairman of the Baltic Shipping Exchange. This gentleman had been connected with the Institution since 1872 and had witnessed the great development which had taken place and led to the acquisition of the palatial premises in St. Mary Axe, at a cost of something like half a million sterling. The Exchange sprung from what was originally a coffee house only and used as a meeting place of traders and shippers.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

Messrs. Cammell, Laird & Co., Ltd.—With the passing into service of the Norwegian Liner *Bergensfjord*, this firm have completed two first-class Atlantic Liners and have shown the facilities possessed by themselves for turning out the highest class of work expeditiously. Together with her sister ship, the *Kristianiafjord*, delivered in May, this vessel will rank amongst the finest steamers plying the Atlantic. Messrs. Gray & Brace, the designers, and Messrs. Johan Vogt & James Maguire, the Liverpool agents for the Company who contracted for the building of the boats were represented on the very successful trials conducted on the Clyde. On September 10th the steamer *Khiva* was launched from the Tranmere yard for the P. and O. Company. This vessel is the first of four building for this Company at Tranmere. The other vessels building for Greek and South

American service are making good progress, also the large train ferry for the Transcontinental Railway Company of Canada. H.M.S. *Audacious* is receiving her finishing touches prior to commission and will shortly leave Birkenhead. H.M.S. *Garland*, destroyer, is now undergoing her steam trials; these it is understood are proving very satisfactory. Several important repair contracts are in hand, amongst others the sailing ships *Thor II.* and *Crown of England*, the tug *Black Cock* and others. Guns are being mounted upon several of the Royal Mail Steam Packet Company's boats, amongst others the *Desna*. Mr. J. M. Allan has been appointed managing director of Messrs. Cammell Laird's works at Sheffield and Penistone. Until recently Mr. Allan occupied a similar position with Messrs. Hawthorn, Leslie & Co., in their Engineering Works.

Messrs H. & C. Grayson.—H.M.S. *Phaeton*, after being partly dismantled, was towed from Devonport to Birkenhead, and is now in Messrs. Grayson's hands preparatory to taking the place of the training ship *Indefatigable*. A second-class cruiser, she was the fastest vessel in her day. She will assume the name and duties of her predecessor in the Mersey. The steamer *Teakwood* is still in hand in the Brocklebank Dock. At Garston the lightship for Trinity House is making good progress on the stocks, besides other contracts on hand.

Messrs. James Pollock, Sons & Co., Ltd.—The motor lighter *Carita*, for service between the Dee and the Mersey Docks, has just been completed. The vessel, which is 101 ft. long, 21 ft. 6 in. beam and 8 ft. 3 in. moulded depth, has a capacity of 200 tons and has been built to the order of Messrs. John Summers & Sons, Ltd., Shotton. A two-cylinder direct reversible Bolinders Crude oil engine of 120 B.H.P. has been installed, Messrs. Pollock being the British representative for the Bolinder engines. Several of these craft have been built and have fully justified the fitting of the Bolinder sets.

Manchester Ship Canal.—About 1,000 men have now started work at the Partington Steel and Iron Works at Irlam. A famine in houses is being experienced in the locality; the local District Council are proposing to build to supply the want. Other developments are also taking place at Trafford Park. On the banks of the Canal adjoining the Manchester Docks, the British Mannesman Tube Company are erecting large works. Messrs. Guinness, of Dublin, are also erecting a large brewery at this spot. Negotiations are on foot for other buildings. It has been seriously suggested that the Eccles Corporation should build a high level bridge connecting this borough with Trafford Park and thus save a detour of two and a half miles.

The Cunard Line—It has been decided that all the westbound vessels on this Company's London and Southampton service to Canada, will call at Queenstown after Oct. 2nd. The *Ascania* will be the first vessel to inaugurate this change. The body of the late Mayor of New York, Mr. Gaynor, was placed on board the *Lusitania* on September 13th for reshipment to New York. Mr. Rufus Gaynor, son of the late Mayor, expressed his deep gratitude to the people of Liverpool and the British nation.

The contract for the supply of a quarter of a million tons of Yorkshire washed steam coal for the Cunard Company's requirements at Liverpool, has been secured by the Carlton Main Colliery Co., Ltd., of Barnsley.

The Late Capt. Soddart.—It is with feelings of deep regret that we record the death of this gallant man. Rescued with three Lascars from the *Wistow Hall* on her fateful voyage from the Tyne to Glasgow last February, he was terribly injured and has never quite recovered from the effects. He became totally blind and suffered much the last few days. He was forty-four years of age, a native of Liverpool and started his career with Messrs. E. F. Powell & Co.

The Navigation of the Dee.—A special meeting has been called to suggest that the Flintshire County Council should join with the Dee Conservancy in promoting a bill to enable the local authorities to give rate aid to the scheme for improving the navigation of the Dee. The scheme has been prepared by Mr. Caradoc Williams, of Chester, the acting conservator. £75,000 is required of which £55,000 has already been promised. A channel eight miles long will be constructed from Connah's Quay to Llanerchymn.

Allan Line.—Messrs. Donaldson Bros. have acquired the fleet of the Allan Line Steamship Co. from Glasgow and Liverpool to Monte Video and Buenos Ayres. The Donaldson Line have also entered the River Plate Conference so that the transference will have no disturbing effect.

The Canadian Pacific Railway Co.— Mr. H. Maitland Kersey, D.S.O. has been appointed by the President to be Manager-in-chief of the ocean services of the Company in the Atlantic and Pacific.

The White Star Line.—Large new offices have been erected by this Company for their marine superintendent, staff, engineers, etc., at the Canada Dock. Messrs. F. H. Heath, Ltd., of Manchester have had the contract.

Holyhead Breakwater.—This structure, which was completed in 1873 and took thirty years to construct, has withstood some of the most severe storms during the past forty years. No additions have been made to the rubble mound which has so conduced to its strength. Messrs. S. Pearson & Sons, Ltd., of Westminster are now engaged depositing some 170,000 tons of quarried stone for the purpose of raising the level of the mound. £54,000 has been granted by Parliament for this work.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—Briskness is still maintained in every department of Messrs. Vickers' Shipyard at Barrow. On the completion of the Japanese battle-cruiser *Kongo* there were, of course, many workmen thrown out of employment, but the launch of the Turkish battleship *Reshadieh* on the 3rd of September opened the door for the employment of a vast army of engineers, electricians, plumbers and others, who are employed in the fitting up of vessels for service. The demand for this class of men will be very considerable for some time to come, as in three months the British battleship *Delhi* will be launched, and then there will be two very large battleships lying side by side being fitted up at the same time. Work has not yet begun in the yard with the new British battleship, but orders for the material required are going out day by day, and it is expected the work of laying the keel of the ship will soon be commenced. Mr. Winston Churchill visited Barrow in the early part of September, and gave the directors of Vickers, Limited, evidence of his thoroughness and cuteness as First Lord in the ready way he moved from place to place and the keen interest he displayed in all branches of work in his department. Of course there is always much for the First Lord to see in a big yard like that at Barrow, which is charged in its several departments with so many orders from the Admiralty. There are two super-" Dreadnoughts" in course of construction, two light cruisers, the *Phaeton* and *Penelope*, a large oil-tank oil driven vessel to serve the fleet with oil out at sea, and a host of submarines, together with a very large amount of engine power, gun mountings, projectiles, limbers and other things needed to keep the navy up to a position of front rank. Mr. Churchill was very greatly interested in the running of a huge oil engine built for the Admiralty, and intended, it is believed, for use on the *Queen Elizabeth* battleship, now almost ready for launching at one of the dockyards. This engine, which developed 900 horse power, has been kept constantly running for 15 continuous hours without a stop, and is still running and demonstrates its dependability in use in regular service. The Barrow firm has spent a deal of money in experimenting with oil engines, and they feel their work in this sense has been abundantly justified in the success they have attained and in the knowledge that oil will play a very great part in the future as a propelling agency, alike of heavy and light warships and in all classes of ships which need to be run at high speeds.

The Reshadieh.—The Turkish battleship *Reshadieh* was launched from the yard of Messrs. Vickers, Limited, on the 3rd September, in the presence of the Turkish Ambassador at the Court of St. James and leading Turkish officials in this country, which seemed to give the lie to the rumour that the vessel would ultimately be bought out by the British Admiralty, owing to Turkey's inability to pay for her. The contract to build the ship was placed with a combination of shipbuilders—Messrs. Vickers, Limited, Messrs. Armstrong, Whitworth & Co., Ltd., and Messrs. John Brown & Co., Ltd.

The Turks present were charmed with the vessel and with its high fighting qualities, and there seems no reason to doubt she will during the course of next year become the first unit of a new navy for the Ottoman empire. It is also reasonable to assume future orders will come to British builders for the building up of a new navy for Turkey. The vessel is now being fitted with her engines, auxiliary machinery, boilers and other incidendals to a complete outfit for service. Quite a number of men who were lately employed on the Japanese battle-cruiser *Kongo* are working on the *Reshadieh*, as it is necessary to make as much progress as possible with the fitting up of the vessel so that the berth and 150 ton crane shall be ready for the British battleship *Delhi* to be launched at the end of the year. There is some talk of widening the passage way between the Buccleuch and Devonshire Docks from 80ft. to 100 ft., so that great vessels of war can be fitted up both in the Buccleuch and Devonshire docks simultaneously, but nothing has yet been definitely decided on.

Aviation.—Very great attention is being devoted to the work of laying out the aviation ground purchased by Messrs. Vickers, Limited, on Walney Island. Here large up-to-date factories will be built in which all classes of airships, aeroplanes, waterplanes and all varieties of air craft will be built. The old airship shed and Cavendish Dock, where the unfortunate *Mayfly* was wrecked, will also be utilised, together with many engineering features in the shipyard itself. This airship area will be very large and capable of almost unlimited expansion, if necessary, at any time. The work of landing airships will soon be commenced. It is understood Messrs. Vickers, Limited, have already the order from the Admiralty to build five "Parsevals."

Other Work.—The third Brazilian monitor will be launched in a few weeks. Work will soon begin on the extension to the Rio de Janeiro floating dock. The keel of the new British "Dreadnought" will be laid in a few weeks.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff.—The leviathan White Star liner *Britannic* attracts the eye of passers-by, being now fully plated and almost completely painted. Rapid progress is also being made with the big vessels building on either side of the *Britannic*—the Holland-America and Red Star liners. Another triple-screw steamer for the Pacific Steam Navigation Co. will be launched from the south end of the yard on October 2nd. This vessel was intended to be launched as *Ormeda*, but her name has been changed to *Orduna*. The *Andes*, a vessel of the same class, for the Pacific Company, was recently completed aud despatched to take up her station, after having been docked in the new graving dock. The overhaul and reboilering of the Atlantic Transport Company's *Maine* has been completed and the vessel has sailed from Belfast, and the new cargo steamer *Maryland*, built in Messrs. Harland & Wolff's Clyde yard for the same owners, has been towed to Belfast and is having machinery fitted on board. Messrs. Harland & Wolff have started building operations on a portion of their new intake, part of which has already been filled up to the required level.

Messrs. Workman, Clark & Co.—Before these notes are in print this firm will have launched a large Holt liner from their North Yard. One of the Royal Mail Company's cargo boats which they have on order is also just about ready for launching in the South Yard. They have had a considerable amount of repair work in hand, including collision damage repairs to Lord Rosebery's steam yacht, and extensive bottom repairs on the steamer *Isobel*, which was bought by Mr. James M'Causland, of Portaferry, as she lay on the rocks on the County Down Coast, salved by him and brought to Belfast for repairs. Messrs. Workman, Clark & Co. have recently come to terms with the Belfast Corporation for an electrical supply of 290 h.p., consuming about 500,000 units per annum. Provision is being made for their ultimate requirements of about double these figures.

Rumoured Shipbuilding Deal.—Some little time since there was a newspaper report to the effect that an amalgamation of the firms of Harland & Wolff and Workman, Clark & Co. was pending. In a good many quarters little credence was given to the rumour. Now another report is current, and one that is far more likely to be correct—that is, that Messrs. Harland & Wolff have acquired Messrs. Workman, Clark and Co.'s South Yard. The premises in question are only divided from the Queen's Island North Yard by a roadway, and would form a most valuable addition to Messrs. Harland and Wolff's resources, being, as it is, a thoroughly well-equipped yard, capable of turning out vessels of very big dimensions. Should this rumour be correct—and there is good reason to believe that it is—Messrs. Workman, Clark & Co.'s entire shipbuilding operations would be concentrated in one spot, the North Yard, to which they have already taken in a big addition, and which is conveniently situated for still further extensions. It is stated that Messrs. Workman, Clark & Co. wished to make the taking over of their engine works a condition of the transaction, but that Messrs. Harland and Wolff could not see their way to acquiesce in this proposal. This is but natural, seeing that they have only recently acquired such a large extension at the rear of their engine works. The disposing of these engineering works would allow Messrs. Workman, Clark & Co. to build new premises on the north side of the river, adjoining their main shipyard, which would be much more convenient than the present arrangement, with the River Lagan intervening.

Dublin.—The Dublin Dockyard Company have recently launched a new steamer named *Patricia*, built to the order of Messrs. Michael Murphy, Ltd., of Dublin, Liverpool, Cardiff and Swansea. The vessel is 200 feet long, 30 feet 6 inches beam, and 14 feet 9 inches deep.

Londonderry.—The North of Ireland Shipbuilding Company's second steamer, the *Glenfoyle*, sailed from Londonderry on August 30th after a very successful trial trip. The new vessel, which is 200 feet long, has been built on the Ayre-Ballard arch principle, and is a sister-ship of the *Glenmavis*, the first vessel turned out by the new Company. Both vessels have been designed for service on the Canadian Lakes. The *Glenmavis* was engined by Messrs. Richardsons, Westgarth & Co., Ltd., and the *Glenfoyle* by Messrs. MacColl and Pollock, of Sunderland.

New City Electric Station.—An arrangement has been come to by which the City Corporation acquire from the Harbour Board a large plot of ground on which to build a new electric station. The price fixed is £40 an acre per annum, and this is £20 an acre less than Messrs. Harland & Wolff are paying for their additional intake; but in fixing the rental the Corporation were influenced by the fact that this electric station is a matter for the good of the whole community.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

During the first three weeks of the past month the dry docks and ship-repairing establishments of the Bristol Channel were well employed, and it was only during the last week that the activity somewhat relaxed. This was primarily due of course firstly, to the slow arrival of tonnage, and in the second place to the fine weather so prevalent recently. During the summer months ship-repairing establishments generally are prepared for quiet times, as the fine weather and absence of fog lessen the chance of accidents occurring to shipping. It is satisfactory to record that no real inactivity has characterized the ship-repairing trade of the Bristol Channel since last winter, and all labour, both skilled and unskilled, has been consistently well employed throughout. As is well-known, the principal establishment in Cardiff own their own dry docks, but there are other important firms who are not in that happy position and who have consequently to rely on the public dry dock belonging to the Cardiff Railway Company, who are the owners of the Cardiff docks. These firms were recently placed in a most difficult position, as in consequence of the extreme drought last month the ordinary dock feeder had become very low, and the public dry dock had to be utilized as a pumping station in order to feed the adjacent wet docks with water. The utilization of the public dry dock for this purpose greatly hampered the operations of those firms mentioned and a number of ships had therefore to be transferred to private dry docks. Fortunately this state of affairs very seldom

prevails and as the summer is now past there will consequently be no likelihood of its recurrence.

Mountstuart Dry Docks, Cardiff.—During the past month the docks of this Company have been kept very busy, a large number of ships being dealt with. *The Wimbledon*, *King David*, and *Wooda* had damage repairs effected, the new Cardiff steamer *Chalister* was fitted with electric light as well as undergoing a general finish preparatory to sailing, while the Houlder liner *Royston Grange*, *Ardanmohr*, *Trabboch*, and other steamers were dry docked and generally overhauled.

Channel Dry Docks and Pontoon Co., Cardiff, were actively employed on a long list of steamers for repairs, general overhauling, and ordinary docking, in their various establishments at Cardiff, Barry, Newport and Sharpness. The steamers dealt with included the *Tregurno*, *Lena*, *Dynas Powis*, *Tanagra*, *Ellaline*, *Angola*, *Svorono*, etc., the latter vessel having heavy collision damage to the stem.

Hill's dry dock, Elliot and Jeffery, Junction dry dock, and John Shearman & Company were all fairly employed on general repair work, but no firm reported particular activity.

Penarth Slipway Co. has enjoyed a satisfactory share of the prosperity and has been giving excellent despatch to steamers entrusted to them for their repairs and overhaul. This firm secured the contract in open competition for the repair of the extensive fire damage sustained by the Norwegian steamer *Fredeborg*, the repairs being completed and the steamer handed over to her owners before the expiration of the specified time for completion of the contract. It is satisfactory to note that this firm has been able to keep its up-to-date plant in constant operation and to give despatch second-to-none in the Bristol Channel.

At Barry the Graving Dock Company and C. H. Bailey were busily employed on overhauls and repairs, and the latter firm dealt with a long list of vessels at their Barry and Newport establishments, amongst the number being the *Greenwood*, *Iolo*, *Glanton*, *Conway*, *Frederick Knight*, *Tunstell*, *Alfalfa*, *Pentwyn*, etc., the latter vessel having sustained extensive damage in her collision with the steamer *Svorono*.

New Deep-water Approach at Newport.—The dock authorities are engaged on the provision of a deep water approach to their new lock entrance in order that the fullest advantage may be given to the large class of vessel for whom it is their intention to cater. The work is being carried on day and night in order that the approach may be completed by the time the new lock entrance itself is ready to be opened for traffic.

Weekly Half-holiday at the Docks.—Last month witnessed the taking effect of the change of Saturday working hours at the docks, which has been the subject of agitation by the trimmers, etc., for a long time past. The men had demanded a one-o'clock stop on Saturdays and on the first Saturday in September work was suspended at that hour at all the Bristol Channel coal-shipping ports. Some amount of inconvenience was caused by the men's action and negotiations are proceeding with a view to the resumption of work on Saturday afternoons at an enhanced rate of overtime. It is to be hoped that the action of the men will not result in any lasting injury to the coal-shipping industry, which of course is the foundation of the prosperity of South Wales

Steam Pilot Service.—The first of September saw the inauguration of the steam pilot service for this port and the appearance of the fleet on its preparatory cruise gave rise to many expressions of admiration. The fleet comprises three steam yachts for carrying out the duties at the three appointed stations, also an ex-Government launch for discharging the duties of tender. The comfortable character of the appointments on the yachts combined with the lessened risk to life in boarding steamers should tend to make the hard life of the pilots more tolerable. The change from sailing cutters to steamers for carrying on the pilot service is merely the inevitable advance with the times, the advance in this particular instance being long delayed.

THE Hamburg-American Co.'s Atlantic liner *Vaterland*, the largest vessel in the world, will be coated, exclusively, with Briggs' bituminous solution and enamel.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Luz Blanca.—On July 21st, Messrs. William Dobson and Co. launched from their shipbuilding yard at Walker the steel screw oil tank steamer *Luz Blanca*, which they have built to the order of The London & Pacific Petroleum Co., Ltd., through Messrs. Lane & Macandrew, of London. The vessel is built to the highest class at Lloyd's with two decks, and poop, bridge and forecastle. There are eight pairs of main oil tanks, divided by a longitudinal bulkhead, thus forming sixteen oil tanks, in addition to which there are twelve summer tanks for light oils. A departure from the ordinary tank steamer has been made by placing the engines and boilers amidships instead of aft. This necessitates four coffer-dams and there are also two pump room coffer-dams, so that several different grades of oil may be carried at the same time, each grade being kept entirely separate by cofferdams. The vessel is also adapted for carrying creosote in bulk, and for this purpose steam heating pipes are fitted in the main tanks for keeping the cargo in a liquid condition. There are three oil pumps for dealing with the cargo, each capable of pumping 150 tons of oil per hour. The propelling machinery, which is being built by the North-Eastern Marine Engineering Co., Ltd., of Wallsend, consists of a set of triple-expansion engines having cylinders 27 in., 45 in., 74 in. by 48 in. stroke, and steam is supplied by three large boilers fitted for burning oil fuel on the Smith-Meyer system. The hull and machinery are built to a very full and complete specification under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London, their resident surveyor being Mr. J. D. Crohan. The trial trip was run on the 30th August and a mean speed of 11·4 knots obtained on the measured mile.

Steel Screw Tug.—On July 21st, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw tug, the principal dimensions being 80 ft. by 20 ft. 6 in. by 10 ft. 6 in. moulded. The vessel has been built to the order of Mr. J. Constant, of London, and will be fitted with powerful triple-expansion engines by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull.

Admiralty Caisson.—Messrs. Swan, Hunter & Wigham Richardson, Ltd., were occupied last year in converting what was comparatively a short time ago merely grazing land on the banks of the river Wear, at Southwick, into an auxiliary establishment to their Wallsend works. The first contract taken in hand there has been a large sliding caisson for one of the Admiralty graving docks at Portsmouth, which was successfully launched on the 21st July. This caisson is an important structure of somewhat complicated design and is practically a duplicate of one recently completed by Messrs. Swan, Hunter & Wigham Richardson for the same dockyard at Portsmouth. Owing to the very large draught of water required for the caisson when afloat it was found desirable to construct it on its side, thus making it considerably easier to launch and to float it out of the river Wear. The preparation of all materials was, in the first instance, carried out at the Wallsend Shipyard. The material was then shipped to the river Wear and erected and riveted together at Southwick. The appliances for quickly handling goods arriving at Southwick by craft or by rail are of the most modern type and all material can be rapidly conveyed to the building berths by bogies controlled at the railway end by cable operated by an electric winch, and handled on the building site by large travelling electric cranes, which together span a width of about 280 ft. As the above-mentioned vessel was the first to be launched from this yard, it aroused considerable interest and was witnessed by a numerous company. The Admiralty was represented by Mr. B. E. Goodyear, of the Admiralty, and Mr. E. C. Walker, overseer for the construction of the caisson. Immediately after the launch the vessel was taken in tow and proceeded down the river Wear. From there she will be brought to the Tyne, where she will be moored and uprighted prior to being towed to Portsmouth.

Winterton.—On July 2nd, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer, which they are constructing to the order of Messrs. The Denaby and Cadeby Main Collieries, Ltd., of London, etc. The vessel is being built

to class 100 A1 at Lloyd's and is of the single-deck type, with poop, bridge and topgallant forecastle. Her principal dimensions are 372 ft. by 52 ft. by 26 ft. 3 in. moulded, and she will carry about 7,100 tons on a light draught of water. Saloon and accommodation for captain will be provided in large deckhouse at fore end of bridge and charthouse on top. The engineers and officers will be berthed in houses at sides of engine casing, while the crew will be located in forecastle. The vessel will have four large holds, five hatches, two masts, eleven derricks, and will be equipped with ten steam winches, steam windlass, hand and steam-steering gear and all the latest and most modern appliances for the rapid handling of cargo. Triple-expansion engines, having cylinders 25 in., 40 in. and 67 in. by 45 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. George Clark, Ltd., Sunderland. The hull and engines are being constructed under the superintendence of Mr. W. W. Nicholas, of Messrs. Nicholas & Meek, Hull.

Vasilefs Constantinos.—On July 25th, the s.s. *Vasliefs Constantinos* was launched from the shipyard of Messrs. Short Brothers, Ltd., at Pallion, Sunderland. She is built on the Isherwood patent system to the order of S. C. Embiricos, Esq., of Athens and Cardiff, her dimensions being—length 368 ft., beam 52 ft. and depth moulded 24 ft. 3 in., and she will carry a deadweight of 7,000 tons on a light draught. The vessel takes Lloyd's highest class and is of the single-deck type, with shelter deck 7 ft. 9 in. high, all fore and aft. An extra large quantity of water ballast is provided in the double bottom, with very large fore and after-peak tanks. Every arrangement that would conduce to economy has been considered in designing the steamer, very large hatches being trunked through the shelter deck to reduce the cost of loading, and the winches specially constructed with extended whipping shafts and large barrels and drums, in conjunction with double derricks stepped on tables at each mast, with outriggers above, so that discharging may be rapidly and easily carried out. The saloon, neatly panelled in oak, is situated in a large deckhouse on shelter deck, together with rooms for owner, steward, spare room, bath-room, etc. House above saloon is arranged for captain, and chart-room with a teak octagonal wheelhouse above. The officers' and engineers' rooms are in deckhouses alongside of engine casing and the crew are berthed in the after end of shelter deck. A large donkey boiler of multitubular type is fitted on the main deck, capable of maintaining a full head of steam when all auxiliary machinery is working. The propelling machinery will be fitted by Messrs. John Dickinson & Sons, Ltd., of Sunderland, and consists of engines with cylinders 25 in., 42½ in. and 69 in. diameter, 45 in. stroke, taking steam from two powerful boilers working at 180 lbs. pressure.

Pawnee.—On July 30th, there was launched from the Hebburn shipyard of Messrs. Palmers' Shipbuilding and Iron Co., Ltd., the oil-tank steamer *Pawnee*, which has been built to the order of the Deutsch Amerikanische Petroleum Gesellschaft, of Hamburg. The vessel, which is a sister ship to the *Osage*, launched from the same yard in May last, is over 380 ft. long, and will carry a deadweight of over 7,300 tons on a light draught. She is built on the Isherwood system of framing, and classed 100 A1 Lloyd's under special survey. She is fitted and finished to the Seemannsordiong and See-Berufsgenossenschaft and to Suez Canal requirements. The oil compartments are divided into seven pairs of tanks, two coffer-dams and pump-room. There is a cargo hold at the fore end of the oil tanks, and water ballast is carried in the cellular double bottom under the engines, and in fore and after peaks. The vessel is to be supplied by the builders with quadruple-expansion engines, steam being supplied by two single-ended boilers arranoed to burn coal or oil fuel, working at a pressure of 215 lbs. per sq. in.

Honoreva.—On August 1st, at Messrs. Osbourne, Graham and Co.'s shipyard, the steamer *Honoreva*, which has been constructed on the arch principle of construction, was successfully launched. She has been built to the order of Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend, for the Donald Steamship Co., of New York and Bristol. Captain T. L. Evans, A.J.N.A., who is managing owner, under whose supervision the vessel has been built, was present at the launch. The *Honoreva* is the latest vessel launched on the arch principle of construction, and she has been designed by Mr. Maxwell Ballard (the patentee) for running in the general trade of the Donald Line, this being the second vessel to be constructed for the latter company, under the patents. Their first vessel on the arch system has been engaged for a considerable time in general trading, and has given entire satisfaction, which resulted in the placing of a second contract on the arch principle for their fleet. The vessel has been designed as a general cargo carrier, and will be engaged in a variety of trades, including the carriage of heavy timber, and is the largest vessel of the owner's fleet. A considerable number of vessels have already been built under the Arch patents, the proprietors of which are Messrs. Swan, Hunter & Wigham Richardson, Ltd., and Mr. Maxwell Ballard, and the system is gaining favour amongst the shipowners in view of the economy and advantages afforded. The inducements to shipowners are a considerable reduction in first cost, together with an increase in deadweight and cubic capacity, and the clearest and deepest holds yet offered to shipowners are provided by this system of construction, while the scantlings of the vessel are not reduced below those of the ordinary type in any way. The saving effected lies in the design, and an actual increase in strength, both transversely and longitudinally, is gained. Among the technical advantages afforded by the arch principle are better maintenance of speed at sea, due to the reduced pitching through redistribution of the cargo throughout the vessel. There are no " wells " for seas to fill and there is a higher deck platform, which means that the vessels ship less water at sea. The above vessel has been constructed as a general trader, but one of the principal properties of the arch system lies in its adaptation to colliers. It is claimed that the design provides the best self-trimming collier on the market, while also vessels can be designed on the arch principle to carry the whole of their deadweight under deck. On the trial run on September 10th everything was very satisfactory, a mean speed of 11½ knots being attained.

Swanmore.—On August 2nd, this large, finely-modelled vessel was successfully launched from the North Sands Shipbuilding Yard of Messrs. Joseph L. Thompson & Sons, Ltd., of Sunderland. This vessel has been specially built to the order of Messrs. William Johnston & Co., of Liverpool, and is the fourth vessel Messrs. Thompson have constructed to the order of Messrs. Johnston. The principal dimensions are—Length 421 ft. by breadth extreme 53 ft. 6 in. by depth moulded 29 ft. 6 in. The vessel has been constructed to Lloyd's highest class, parts of the structure being considerably in excess of the classification requirements, and is of the awning deck type with three decks laid, with a large topgallant forecastle. She will be fitted with eleven steam winches and twelve derricks, provision being provided at each mast for dealing with derricks capable of lifting 20-ton lifts. The steering gear is of the Wilson-Pirrie's telemotor principle, fitted in a house at the after end of the vessel, controlled from amidships, and provision has been made for a wireless communication intallation. Electric lighting will be fitted throughout by Messrs. The Sunderland Forge and Engineering Co., Ltd., of Sunderland. The engines and boilers have been constructed by Messrs. George Clark, Ltd., of Sunderland, the sizes of the cylinders being 27 in., 45 in., 76 in. by 54 in. stroke, supplied with steam by four large boilers working at 180 lbs. pressure. The engines and boilers have been constructed under the personal supervision of Mr. D. Beatson, the construction of the hull being supervised by Mr. C. Surtees. Messrs. Wailes, Dove & Co.'s " Bitumastic " enamels have been applied throughout the bunkers, tanks, etc., and their " Bitumastic " covering to the tank top.

Corvin.—On August 5th, Messrs. William Dobson & Co. launched from their shipbuilding yard at Walker the steel screw passenger and cargo steamer *Corvin*, which they have built to the order of Messrs. The Hungarian Levant Steamship Co., Ltd., of Budapest, for their service between Braila, Galatz and other Danubian ports and Constantinople. Accommodation is provided for about thirty first-class passengers amidships, the sleeping cabins being in the bridge, the dining saloon in deckhouse on bridge and the smoking lounge on the promenade deck. The second-class passengers are berthed on the after part of the bridge, and the third-class in the poop 'tween decks. Special arrangements have been made for the stowing and handling of the miscellaneous Danube cargoes, and the auxiliary machinery is very complete, including a Wilson-Pirrie silent steering gear actuated by telemotor gear from navigating bridge and there is a

complete installation of electric light. The propelling machinery, which is being constructed by the North-Eastern Marine Engineering Co., Ltd., of Wallsend, is on the triple-expansion principle, with cylinders 19 in., 32 in. and 52 in. diameter and 36 in. stroke, steam being supplied by two single-ended boilers. The principal dimensions of the vessel are:—Length between perpendiculars, 240 ft.; breadth, 36 ft; depth moulded, 16 ft. 7½ in. Both hull and machinery are constructed to the highest class at Lloyd's and in accordance with the Hungarian Government requirements for passenger and cargo steamers. The construction has been supervised by Mr. Walter J. Milne, of North Shields, on behalf of the owners.

Silva.—On August 5th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay-on-Tyne, a steel screw steamer of the following dimensions, *viz.*:—Length, 367 ft.; breadth, 51 ft.; depth, moulded, 32 ft. 4 in. The vessel, which has been built to the order of Messrs. C. T. Bowring & Co., Ltd., of Liverpool and London, is designed for the purpose of carrying petroleum and other oils in bulk, and is built on the Isherwood patent system of longitudinal framing and to the highest classification at Lloyd's. The vessel is fitted with a very complete oil pumping installation, including oil pumps of large size for working against a heavy back pressure, and is also fitted with a complete system of steam heating coils for creosote and heavy oils in each tank, and also complete installation of gas-freeing pipes. The accommodation, which is much superior to the ordinary class of vessel, has been carried out to the special requirements of the owners and includes steam heating and electric light throughout. The machinery, which has been constructed by Messrs. North-Eastern Marine Engineering Co., Ltd., consists of engines having cylinders 27 in., 45 in. and 74 in. by 48 in. stroke, with three single-ended boilers working at a pressure of 180 lbs. During construction the vessel and machinery have been under the inspection of Messrs. Jacobs & Barringer, of London, and Mr. W. Bradney, their local representative, and Captain Matthews, of Messrs. C. T. Bowring & Co., Ltd., of Liverpool. The trial trip took place on the 9th of September and in a series of runs over the measured mile the average speed attained in loaded condition was over 11 knots, which was considered very satisfactory.

Eastern City.—On August 5th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions:—Length, 403 ft. 6 in.; breadth, 52 ft. 6 in.; depth (to shelter deck), 34 ft. 6 in. The vessel is built to the highest class in the British Corporation Registry, having upper and shelter decks. The accommodation for captain, officers and engineers is arranged in houses on shelter deck, crew in the forecastle. The vessel has been built to the order of Messrs. W. R. Smith & Sons, of Cardiff, and has double bottom for water ballast on the cellular principle, and in fore and after peaks. She will be fully equipped with an up-to-date outfit including quick-warping steam windlass, stockless anchors, steam-steering gear amidships, and powerful hand screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler working at 100 lbs. pressure per sq. in. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, of about 1,900 i.h.p., having two steel boilers 17 ft. 6 in. by 11 ft. 6 in., 180 lbs. pressure of steam. Very satisfactory trials were run on September 13th, during which the vessel attained a speed of 12 knots.

Elf King, Peary and Prince Leo.—On August 5th, there were launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, two steel screw trawlers named *Elf King* and *Peary*, the principal dimensions being 133 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessels have been built to the order of Messrs. J. H. Robins & Co., Ltd., and Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., of Hull, respectively. They will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. On the same day another trawler named *Prince Leo* was launched, the principal dimensions being 117 ft. by 22 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. H. Bernstein, of Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull.

Pacific Transport.—On August 7th, the Northumberland Shipbuilding Co., Ltd., Howden-on-Tyne, launched the finely-moulded steamer *Pacific Transport*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Empire Transport Co., Ltd., London. The vessel is about 400 ft. long by 52 ft. beam by 29 ft. 6 in. deep, of the single deck type, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle; accommodation in steel houses in bridge deck. There are ten steam winches, by Messrs. Clarke, Chapman & Co., Ltd., and a large number of cargo derricks and steam windlass, by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry over 8,000 tons on a light draught and steam about 10 knots loaded at sea. During construction the vessel has been superintended by Mr. Ross and Mr. Flowers.

Caldy.—On August 14th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions:—Length overall, 394 ft.; breadth, 51 ft.; depth moulded, 27 ft. 3 in. The gross tonnage is about 4,220 tons and the deadweight about 7,500 tons on a moderate draught. This vessel has been built to the order of the Fargrove Steam Navigation Co., Ltd., of London (Messrs. Farrar, Groves & Co., Ltd., managers), will class 100 A1 in Lloyd's Register, and has been built under special survey. She is a single-deck steamer with cargo poop, long bridge from before foremast to abaft mainmast, and topgallant forecastle. The engines, by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in., 70 in. by 48 in. stroke, steam being supplied by three single-ended boilers having a working pressure of 180 lbs. and a large marine type donkey boiler. The hull and machinery have been constructed under the supervision of Mr. F. W. Bardens, superintendent engineer to the Fargrove Line. This is the twentieth steamer built by Messrs. Richardson, Duck & Co., Ltd., to the order of Messrs. Farrar, Groves & Co., Ltd.

LAUNCHES—Scotch.

Berrima.—Messrs. Caird & Co., Greenock, launched recently another steamer for the Peninsular and Oriental Steam Navigation Co. The vessel, which was named *Berrima*, is intended for the Company's branch service to Australia *via* the Cape. She is of the following dimensions:—Length, 515 ft.; breadth, 62 ft. 6 in.; depth, 42 ft. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and steam pipes with their patent non-conducting composition, and are also insulating the bulkhead with their patent bulkhead insulation. The *Berrima*, which is a finely modelled vessel of 11,000 tons, and is classed 100 A1 at Lloyd's, is a sister ship to the *Beltana*, the *Ballarat* and the *Benalla*, all of which have been built by Messrs. Caird.

Ludwig Weiner.—Messrs. Ferguson Brothers, Port Glasgow, launched recently, with machinery on board, the twin-screw harbour service steamer *Ludwig Weiner*, which they have built for the Colonial Government for service at Cape Town Harbour. The vessel is constructed to Lloyd's highest class and has a Board of Trade passenger certificate. She is fitted with an automatic four-cylinder towing machine of the most modern and powerful type. Wireless telegraphy and submarine signalling apparatus are included in the equipment. The machinery, which was supplied by the builders, consists of twin-screw triple-expansion engines of 2,500 i.h.p. The propellers are of manganese bronze. The engine-room is fitted with all the latest auxiliaries. Steam is supplied by four Babcock & Wilcox water-tube boilers, of the marine type, having up-takes leading into one large funnel.

Confederate.—Messrs. A. Hall & Co., Aberdeen, launched recently a steam trawler, which they have built for Mr. Thomas L. Devlin, Grantown and Aberdeen. The vessel, which was named *Confederate*, is 115 ft. in length, 22 ft. in

breadth, and 12 ft. 9 in. in depth. She will be supplied with triple-expansion engines by the builders.

Lizzie Birrell.—Messrs. Herd & Mackenzie, Findochty, have launched a fishing steamer named *Lizzie Birrell*, built to the order of Messrs. W. Herd & Sons, Findochty. The vessel, which is 86 ft. in length, will be supplied with triple-expansion engines by Messrs. Lewis & Son, Aberdeen.

Radja.—On August 21st, an important addition to the Dutch mercantile marine was made when there was launched from the shipbuilding yard of Messrs. William Hamilton and Co., Ltd., Port Glasgow, the steel screw steamer *Radja*. This vessel, which is intended for pilgrim transport and general trade with the East, is the first of three steamers which the Port Glasgow firm have on hand for Messrs. The Stoomvaart Maatschappij "Nederland" of Amsterdam. During the past few years Messrs. Hamilton & Co. have executed quite a number of orders for the same Company. The principal dimensions of the *Radja* are:—Length, 470 ft.; breadth, 56 ft.; depth to shelter deck, 38 ft. 3 in. In order to facilitate the handling of general cargo, the vessel has been fitted with twenty large steam winches, each working in conjunction with a steel tube derrick. Eight of the winches are of Sieurins make. Special arrangements have been made for the convenience of the pilgrims. All the decks are of teak and the vessel is lighted by electricity throughout. Safety from fire is secured by an installation of a Marot fire-extinguishing apparatus. The *Radja* is fitted with wireless telegraphy, Welin's patent davits suitable for double-banked lifeboats, etc. After the launch the vessel was taken in tow to Glasgow, where Messrs. D. Rowan & Co. will supply the machinery. This consists of triple-expansion engines and six single-ended marine boilers of 200 lbs. working pressure and fitted with Howden's forced draught. All suitable for a sea speed of 13½ knots. The vessel has been constructed under the supervision of Mr. C. E. Visker, the Company's superintendent, and assistants, and also Mr. A. M. Cornelissen, consulting naval architect, Amsterdam.

Ardgrath.—On August 22nd, Messrs. George Brown and Co., Greenock, launched the steamer *Ardgrath*, the first of three vessels which they are building for Messrs. Lang and Fulton, Ltd., Greenock. The dimensions of the *Ardgrath* are:—Length, 200 ft.; breadth, 29 ft.; and depth moulded, 15 ft. The vessel has been specially designed for carrying machinery and girders up to 110 ft. in length. Engines and boilers designed to give a sea speed of 10½ knots will be supplied by Messrs. Ross & Duncan, Glasgow.

Llanstephan Castle.—On August 29th, the latest addition to the Union-Castle Line, the *Llanstephan Castle*, a vessel of the popular intermediate class, was launched by the Fairfield Shipbuilding and Engineering Company, Glasgow. The *Llanstephan Castle* is about 520 ft. in length overall, 63 ft. 4 in. in breadth, 41 ft. in depth, and of about 11,500 tons gross, while she will have a speed at sea of about 13 knots. She has been built under special survey by Lloyd's and to the requirements of the Board of Trade. There are seven decks, a double bottom and many water-tight bulkheads. The passenger accommodation, on four decks, includes a large number of one-berth cabins for first-class passengers. The first-class public-rooms consist of reading-room, lounge and smoking-room on the promenade deck and dining saloon on the upper deck. The main stairway opening direct into the saloon is well and centrally situated and has a passenger elevator. Abaft the main dining saloon is an auxiliary or children's dining-room. The second-class accommodation is arranged aft of the first-class, and there are a music-room on the bridge deck, a smoking-room on the shelter deck, and dining saloons on the upper deck. The third-class accommodation is in the poop, with cabins for two or four persons, a smoking room, and a dining saloon. A complete outfit of boats and life belts is provided, and arrangements are made for the rapid and safe handling of the lifeboats. A motor is connected to the emergency dynamo for lowering the boats electrically in cases of emergency. There is an installation of wireless telegraphy, and the *Llanstephan Castle* is fitted with submarine signal apparatus. The propelling machinery consists of two sets of quadruple-expansion engines, and steam is supplied by three double and two single-ended boilers.

Innishowen.—Messrs. P. M'Gregor & Sons, Kirkintilloch, have now launched the last of the eight oil engined vessels which they are building for the Coasting Motor Shipping Company, Glasgow. This vessel, which is named *Innishowen*, is 76 ft. in length, 18 ft. 3 in. in breadth, 9 ft. 6 in. in depth, and of 112 tons gross. She is to be fitted with a Kromhout engine of 110 h.p. The vessel is too long for the canal locks, and after the launch the bow was taken off, to be refitted at Bowling.

Tottori Maru. On September 1st, Messrs. Russell & Co., Port-Glasgow, launched a steamer named *Tottori Maru*, which they have built for the Nippon Yusen Kaisha, Tokio, Japan. The principal dimensions of the vessel are:—Length, 423 ft. 6 in.; breadth, 56 ft.; depth, 31 ft. 3⅜ in., and gross measurement 5,800 tons. The machinery will be supplied by Messrs. J. G. Kincaid & Co., Greenock. The engines will have cylinders of 27 in., 44 in., and 73 in. in diameter respectively, with 48-in. stroke, steam being supplied by three boilers under forced draught. The vessel has been built to the highest class at Lloyd's, and is intended for her owners' general carrying trade. During construction the vessel was superintended by Messrs. A. R. Brown, M'Farlane & Co., Glasgow.

Hopper Steamer. On September 1st, Messrs. Wm. Simons and Co., Ltd., Renfrew, launched complete with all machinery on board, and with steam up ready for trials, a 700-ton hopper steamer, being the fourth of a fleet of eight dredging vessels they have on hand for the Naval Port, Emperor Peter the Great, now under construction at Reval, by the Imperial Russian Government, for warship purposes. The vessel is propelled by compound surface-condensing marine engines, supplied with steam from a mild steel horizontal multitubular boiler constructed for a working pressure of 120 lbs. per square inch. Powerful steam gear is provided for rapidly raising and closing hopper doors. The vessel has been built under the survey of Bureau Veritas for classification in their Registry, and under the inspection of Captain M. A. Schmidt, I.R.N.

Comber. On September 2nd, Messrs. Scott & Sons launched from their shipbuilding yard at Bowling a screw steamer of 160 ft. by 25 ft. 5 in. by 12 ft. 3 in. (moulded), built to the order of Messrs. John Kelly, Ltd., Belfast, for their coal trade. Compound engines will be supplied by Messrs. Aitchison, Blair, Ltd., Clydebank.

Socrates.—On September 2nd, Messrs. Russell & Co., Port Glasgow, launched the steamer *Socrates*, which they have built to the order of Messrs. Lamport & Holt, Liverpool. The dimensions of the vessel are:—Length, 405 ft.; breadth, 52 ft. 3 in.; depth moulded, 30 ft., and gross tonnage, 5,000. She has been built to the highest class in the British Corporation, and is for the owners' general carrying trade. Machinery will be supplied by Messrs. Rankin & Blackmore, Greenock. The vessel has been superintended during construction by Captain Bird, marine superintendent, and Mr. J. Dall, engineer superintendent.

Clan Maccorquodale.—Messrs. Charles Connell & Co., Scotstoun, have launched a steel screw steamer, built to the order of Messrs. Cayzer, Irvine & Co., for the Clan Line. The vessel, which is of about 5,070 tons gross, has been built to Lloyd's highest class. She is fitted with modern appliances for the rapid and efficient working of cargo. Triple-expansion engines will be supplied by Messrs. Dunsmuir & Jackson, Govan.

Llandovery Castle.—On September 3rd, the twin screw steamer *Llandovery Castle*, built by Messrs. Barclay, Curle and Co., Whiteinch, to the order of the Union-Castle Mail Steamship Company, was launched. The vessel, which is intended for service on the east coast route to South Africa, has been constructed to the highest requirements of Lloyd's and the Board of Trade for foreign-going passenger steamers. She is 517 ft. in length, 63 ft. in breadth, 40 ft. in depth, and of 11,000 tons gross. The vessel has three steel decks, a combined poop and bridge, a long forecastle, promenade deck, and boat decks amidships and aft, all exposed decks being sheathed with teak. Ample space is thus provided for promenade for all classes of passengers. A double bottom is fitted for the full length of the steamer, and this, together with numerous watertight bulkheads, provides the maximum security against accidents. Accommodation is provided for about 213 first-class, 110 second-class, and 100 third-class passengers, and, in addition, the forward 'tween decks are arranged for emigrants in portable quarters. The first-class

are berthed in rooms on the upper and bridge decks, and the second-class entirely on the upper deck. The accommodation generally on the vessel shows a marked advance on anything previously fitted into vessels on the South African service. In the first-class there is a large number of single-berth cabins, various suites with private bath-rooms, and cot beds in the majority of the rooms, which are much more spacious than has hitherto been considered sufficient for the South African traveller. Electric lighting, steam heating, electric bells, natural and electrical ventilation, together with a complete installation of thermotanks, are all fitted throughout the vessel. The thermotank installation has been specially arranged so that each passenger can regulate the supply of air to any degree up to changing the air in his cabin twelve times per hour. Printing room, drying room, hospitals, dispensaries, mail rooms, refrigerated store rooms and all other necessary accommodation are provided. Adjacent to the usual hairdressing department is situated a "shop," where various articles in request amongst passengers may be purchased during the voyage. A large refrigerating plant, with special insulated chambers, is situated on the lower deck for the carriage of meat, fish, poultry, vegetables, fruit and milk. The facilities for handling cargo are of the most complete description, including a derrick capable of lifting 30 tons and eleven powerful winches (one specially for hoisting boats). Sixteen lifeboats, with collapsible boats, provide seating accommodation for all on board. The machinery consists of two powerful sets of quadruple-expansion balanced engines, constructed by the builders, supplied with steam from three large double-ended and two single-ended boilers of sufficient power to drive the vessel at a sea speed of 14½ knots. The vessel is a very fine example of a modern passenger steamer of moderate speed, and represents the joint experience gained by the builders and the owners during a business connection extending over fifty-eight years. In that time Messrs. Barclay, Curle & Co. have constructed sixty vessels for the Union-Castle Line.

Clan Macquarrie.—On September 16th, Messrs. Alex. Stephen & Sons, Ltd., Linthouse, launched a large cargo steamer for Messrs. Cayzer, Irvine & Co., Ltd. The vessel, which has been constructed to British Corporation requirements, is of the following dimensions:—Length, 430 ft.; breadth, 55 ft. 6 in.; and depth, 37 ft. to shelter deck. Designed for the Eastern trade, the liner has a full equipment of derricks, including one of 40 tons, and also a number of powerful winches to facilitate the handling of heavy cargo. Besides having a cellular double bottom, the vessel has a deep tank amidships, capable of carrying 1,200 tons of water ballast. The machinery, which has been supplied by the builders, consists of a set of triple-expansion engines, having cylinders 29 in., 49 in. and 80 in. diameter, with a stroke of 60 in., steam being provided by three large single-ended boilers and a donkey boiler.

Saint Cecilia.—On September 16th, The Greenock and Grangemouth Dockyard Co., Ltd., launched from their Greenock yard the finely modelled steel screw cargo steamer *Saint Cecilia*, which they have built to the order of Messrs. A. Mackay & Co., Glasgow. The dimensions of the vessel are:—Length, 390 ft. by 52 ft. 3 in. by 28 ft. moulded, carrying a total deadweight of 7,400 tons on 23-ft. draught. Powerful machinery will be supplied by Messrs. Rankin and Blackmore, Greenock, which is estimated to drive the vessel at a loaded sea speed of 11 knots. The construction of the hull and engines has been superintended by Messrs. G. S. Goodwin & Co., Liverpool.

Irrawadi.—On September 10th, the Ailsa Shipbuilding Co., Troon, launched the steel screw passenger and cargo steamer *Irrawadi*, which they have built for the Bombay Steam Navigation Co. The order was placed by Messrs. Dunsmuir & Jackson, Glasgow, who are supplying the propelling machinery. The vessel is 225 ft. in length, 34 ft. in breadth, and 20 ft. in depth, and her machinery is designed to give a speed of 11 knots. The vessel, which was launched without ceremony, was superintended during construction by Mr. Wm. M'Arthur Morison, Glasgow.

Hopper Steamer.—On September 22nd, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched complete with all machinery on board, and with steam up ready for trials, a 700-ton hopper steamer, being the fifth of a fleet of eight dredging vessels they have on hand for the Naval Port, Emperor Peter the Great, now under construction at Reval, by the Imperial Russian Government for warship purposes. The vessel is propelled by compound surface-condensing marine engines, supplied with steam from a mild steel horizontal multitubular boiler constructed for a working pressure of 120 lbs. per square in. Powerful steam gear is provided for rapidly raising and closing hopper doors. The vessel has been built under the survey of Bureau Veritas for classification in their registry, and under the inspection of Captain M. A. Schmidt, I.R.N.

LAUNCHES—Irish.

Calamares.—On September 2nd, Messrs. Workman, Clark and Co., Ltd., launched from their North Yard, the twin-screw steamer *Calamares*, built by them for general fruit-carrying and passenger services between New York and West Indian Ports. The *Calamares* is 486 ft. in length, with a gross tonnage of about 8,000, and is built in accordance with the requirements of the British Corporation Registry of Shipping, the British Board of Trade and the United States Steamship Inspection Service. The accommodation for about 150 first-class passengers is a special feature of the vessel, being an admirable combination of artistic design and general efficiency. The state-rooms are all roomy apartments, arranged for one, two and three persons, and include a number of special cabins, luxuriously furnished and provided with private lavatories. The public rooms include a commodious dining saloon, a luxurious music saloon, and a comfortable smoking room. All the public and private rooms are efficiently ventilated by cooled air delivered through ducts, while each room is also provided with an electrically-driven fan. The cargo holds are divided into nine compartments, all of which have been insulated and otherwise prepared for the carriage of fruit in bulk, this cargo being preserved during transit by cooled fresh air delivered through ducts from the refrigerating rooms to each compartment. The propelling machinery consists of two sets of quadruple-expansion engines, complete with all the necessary auxiliary appliances and supplied with steam from three double-ended and one single-ended steel cylindrical multitubular boilers working under forced draught.

Phemius.—On September 20th, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their North Yard the new steamer *Phemius*, built by them for the Ocean Steamship Co., Ltd., Liverpool (Messrs. Alfred Holt & Co.). The *Phemius* is 457 ft. in length, with a gross tonnage of about 6,700, and has been constructed on the owners' girder system, which ensures increased strength, as well as unobstructed cargo space in the holds, and thus permits of the stowage of the largest class of consignments. The vessel has four large holds and two smaller compartments, which are arranged for use either as cargo holds or as water ballast tanks. Accommodation is provided for a number of saloon passengers, also steerage passengers in the forecastle and natives in the 'tween decks. Particular attention has been given to the ventilation of the passenger accommodation, and an efficient installation of heating is provided. The propelling machinery consists of a set of triple-expansion engines with the necessary auxiliaries supplied with steam from two double-ended boilers, working under forced draught, with an auxiliary single-ended boiler for the deck machinery.

TRIAL TRIPS.

Midland.—On August 9th, this vessel, which was launched on 27th May last, was taken for trial at sea, when she attained a mean speed of over 11 knots on the measured mile. For Launch, see July issue.

Attendant.—On August 21st, the twin-screw passenger tender *Attendant*, built by Messrs. Harland & Wolff, Ltd., at their Govan Works, Glasgow, for Messrs. Elder, Dempster and Co., Ltd., Liverpool, left the builders' fitting-out basin at Govan, and, after satisfactory trials, proceeded to Liverpool, whence she will sail shortly for Lagos. Mr. Wilkie represented the owners on the trial trip and proceeded with the vessel to Liverpool. For Launch, see August issue.

Gifford.—On August 23rd, the steamer *Gifford*, built and engined by Messrs. William Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. Gifford, Ltd., Glasgow

(managers, Messrs. Andrew Weir & Co., London), ran a successful trial trip at sea, when a speed of 13 knots was attained. For Launch, see September issue.

Eustace.—On August 23rd, the s.s. *Eustace* proceeded on her official trial trip in Hartlepool Bay. The vessel has been built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., for The Pyman Steamship Co., Ltd., West Hartlepool (Messrs. George Pyman & Co., managers). Throughout the trial the engines and all auxiliaries worked admirably, a speed of 13 knots being attained, and the vessel afterwards proceeded on her voyage. For Launch, see September issue.

Chalister.—On August 25th, the large steel screw steamer *Chalister*, built by Messrs. David & William Henderson and Co., Ltd., at Partick, Glasgow, for Messrs. A. H. & E. Gunn, Cardiff, underwent her trials on the Firth of Clyde. Everything worked well and to the satisfaction of owners and builders. A speed of 12 knots was easily attained on the measured mile. For Launch, see August issue.

Borgland.—On August 26th, the steel screw steamer *Borgland*, which has been built by the Blyth Shipbuilding and Dry Docks Co., Ltd., to the order of Petter Olsen, Esq., of Christiania, left the builders' works for trial at sea. The performance of both ship and machinery on trial afforded every satisfaction to all concerned. For Launch, see August issue.

Winamac.—On August 27th, the oil tank steamer *Winamac*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, for the Tank Storage and Carriage Co., London, was taken to sea for her official trial trip, which proved highly satisfactory. Immediately after the trials the vessel proceeded to the Tyne for bunkers, and thence to New York to load, under command of Captain N. MacDonald. For Launch, see September issue.

Manchester Civilian.—On August 28th, the steel screw steamer *Manchester Civilian*, built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., for The Manchester Liners, Ltd., Manchester, had a most successful trial trip in Hartlepool Bay. The contract has been carried out under the supervision of Mr. T. Mason Greenip, M.I.N.A., the Company's superintendent, and many of the arrangements for the rapid manipulation of cargo and the economy of working both at sea and in port are due to his initiative. During the trial trip, the engines and all auxiliaries worked in a most satisfactory manner, and the owner's representatives expressed themselves as highly gratified with the performance of the ship and her machinery. For Launch, see September issue.

Arabistan.—On August 30th, the trial trip of the handsome steel screw steamer *Arabistan*, built by Messrs. William Gray & Co., Ltd., for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London, took place. The performance of the ship and machinery was entirely satisfactory, a speed of 14½ knots being obtained. For Launch, see September issue.

Shirley.—On August 30th, the *Shirley*, built by the Sunderland Shipbuilding Co., Ltd., to the order of the Mitre Shipping Co., Ltd. (Messrs. Houlder, Middleton & Co., Ltd., managers), was taken to sea on her official trial. The trial proved to be a most successful one; everything worked smoothly, and a highly satisfactory mean speed of 13·3 knots was obtained. On completion of the trial, the steamer proceeded direct to New York, to take her place in the owners' trade, for which she has been specially designed. For Launch, see September issue.

Visegrad.—On September 8th, the steamer *Visegrad*, a handsome twin-screw steamer which has been built and engined by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works, Newcastle-on-Tyne, to the order of the Ungaro-Croata Steam Navigation Company, of Fiume, for the mail and passenger service of that Company between Fiume and ports on the Dalmatian coasts, completed a very successful trial trip off the Tyne. The vessel then returned to the Tyne to complete her preparations for her voyage to the Mediterranean. For Launch, see September issue.

Ecaterini Matsouki.—The new Wear-built steamer *Ecaterini Matsouki* has been to sea on her trial trip. She has been constructed to the order of Mr. J. G. Matsoukis, of Braila. Her principal dimensions are: Length, 357 ft.; breadth, 48 ft.; and depth, moulded, to bridge deck, 31 ft. The vessel is classed 100 A1 at Lloyd's, but with extra strength in excess of Lloyd's requirements. The engines are of the triple-expansion type, with cylinders 23½ in., 39 in. and 64 in. in diameter, with 42-in. stroke. On the trial the machinery worked very smoothly, a mean speed of nearly 12 knots being attained.

Mardinian.—The steel screw steamer *Mardinian*, built at Middlesbrough for the Ellerman Lines, Ltd., Liverpool, has just been taken for her official trial trip. The performance of ship and machinery gave entire satisfaction to all concerned, the average speed obtained being over 11 knots. For Launch, see August issue.

Carlo.—On September 13th, the new steamer *Carlo*, built and engined by the Clyde Shipbuilding and Engineering Company, Port Glasgow, for Messrs. Thomas Wilson, Sons and Co., Hull, ran trials on the Clyde. For Launch, see September issue.

Kandahar.—The steamer *Kandahar*, which has been built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, for the Bucknall Steamship Lines, has just successfully run her trials at sea. The triple-expansion engines and boilers were supplied by the Wallsend Slipway and Engineering Company, and they worked without a hitch during the trial, to the satisfaction of all concerned. A speed of nearly 14 knots an hour was easily maintained on the measured mile. For Launch, see September issue.

Morinda.—The Grangemouth-built passenger steamer *Morinda* has been taken on a trial trip on the Firth of Forth. The machinery worked smoothly, a mean speed of 15¼ knots being attained. Messrs. Matthew Keenan & Co., Ltd., have just completed a contract on this vessel, where they have covered all the boilers and steam pipes with their patent compositions. For Launch, see August issue.

Holtye.—An important addition has just been made to the fleet of Francis S. Holland, Esq., of London, in the fine steel screw steamer *Holtye* built by the Northumberland Shipbuilding Co., Ltd., which vessel has recently completed a very satisfactory trial trip off the River Tyne. The trial trip proved in every way satisfactory and a speed of 13 knots was obtained, after which the vessel proceeded to the Commissioners' Staith for bunker coal, whence she leaves for Savannah under the command of Captain Ross. For Launch, see September issue.

Andes.—On September 11th, the new mail and passenger steamer *Andes*, constructed for The Pacific Steam Navigation Company by Messrs. Harland & Wolff, Ltd., left Belfast for Southampton to take up her position in the R.M.S.P. South American Mail Service. The *Andes* is to be employed in the accelerated South American Mail Service of The Royal Mail Steam Packet Co., and sailed on her first voyage on the 26th September from Southampton. The chairman of the Pacific Co., Mr. T. Rome, and the general manager, Mr. F. Alcock, accompanied the vessel to Southampton, also Captain Drummond, marine superintendent, and Mr. H. Forbes, superintendent engineer, of the Pacific Co. Captain Hicks, marine superintendent, and Mr. J. E. Wimshurst, superintendent engineer, of the Royal Mail Co., under whose supervision the vessel and her machinery have been constructed, were also on board. For Launch, see June issue.

BOARD OF TRADE EXAMINATIONS.

August 21st, 1913.—LONDON.—*1st Class:* J. Aitken. *2nd Class:* H. Larcombe, F. Malcolmson, J. Sulley.

PLYMOUTH.—*2nd Class:* H. Richards, L. Stribling.

GLASGOW.—*1st Class:* J. Gibson, A. Johnstone, A. Kerr, J. McColl. *2nd Class:* T. Adam, D. Corr, A. Drysdale, H. Jardine, J. McFadyen, J. Munro, W. Redmond.

SOUTHAMPTON.—*1st Class:* V. Laycock. *2nd Class:* G. Clift.

NORTH SHIELDS.—*1st Class:* G. Maxfield, J. Tinn. *2nd Class:* G. Bowman, W. McIntyre, A. Pilter, W. Potts, A. Zubizarretta.

LIVERPOOL.—*1st Class:* J. Cole, W. Knibbs, C. Tholen. *2nd Class:* E. Carson, A. Farquher, T. Gray.

WEST HARTLEPOOL.—*1st Class:* W. Atkinson, F. Ford, E. Oswald. *2nd Class:* W. Bevan, D. Ewan, W. Exelby, T. Nesbitt, G. Shadforth, W. Sturgeon.

LEITH.—*1st Class:* A. Hendry, J. Mattison, D. Wilson, A. Wood. *2nd Class:* D. Cook, A. Duncan.

CARDIFF.—*1st Class:* T. Fry, H. Sutherns. *2nd Class:* L. Evans, I. Richards, G. Wilcox.

August 28th, 1913.—LONDON.—*1st Class:* R. Mansfield, G. Pacey, M. Shand. *2nd Class:* B. Green, C. Jarves, W. Kay, E. Kelt, H. Miller, H. Ritchie, H. Warren.

ABERDEEN.—*1st Class:* G. Joss, I. Lumsden, G. Minty. *2nd Class:* B. Geils, J. Mackintosh.

BRISTOL.—*1st Class:* V. Manley, E. Phillips. *2nd Class:* J. Davies, B. Lomax.

HULL.—*2nd Class:* W. Dingwall, G. Greenfield, H. Raper, R. Warner.

LIVERPOOL.—*1st Class:* J. Beggs, A. Brittlebank, A. Hughes. *2nd Class:* J. Hill, J. Sirrell, J. Thomas.

GREENOCK.—*1st Class:* J. Clinton, A. Wallace. *2nd Class:* W. Andrew, P. Gillies, A. Scott, H. Tennent.

NORTH SHIELDS.—*1st Class:* C. Duncan, J. Ewart, R. Thomson. *2nd Class:* J. Paterson, H. Pringle.

SUNDERLAND. *1st Class:* T. Humble, E. Jackson, J. Leviss, E. Stephenson. *2nd Class:* H. Cook, J. Stafford.

September 4th, 1913.—LONDON.—*1st Class:* H. Aldridge. *2nd Class:* J. Donnell, O. Kverndal, H. Webster.

NORTH SHIELDS.—*1st Class:* A. Mundell, F. Roosledge, W. Vincent. *2nd Class:* A. George, T. Harrison, S. Pice, W. Stephen, S. Warren.

SOUTHAMPTON.—*1st Class:* R. Holly, A. Slade, E. Wilson. *2nd Class:* F. O'Connell.

CARDIFF.—*1st Class:* D. Jones, N. McCallum, A. Rowe. *2nd Class:* J. Miles, R. Proud, G. Slater, J. Ward.

LIVERPOOL.—*1st Class:* T. Baldock, T. Barnes, H. Pratt, G. Pritchard, G. Townson, C. Williams. *2nd Class:* A. Davies, S. O'Leary, O. Owen, C. Sutton, A. Tulloch.

BELFAST.—*1st Class:* W. McKersie. *2nd Class:* W. Donaldson.

LEITH.—*2nd Class:* C. Dunbar, J. Fawns, W. Tait.

GLASGOW.—*1st Class:* A. Caldwell, E. Lehmann, R. Macfarlane. *2nd Class:* P. Fox, K. Hood, J. Nicol.

September 11th, 1913.—LONDON.—*1st Class:* F. Lindley, O. Richards. *2nd Class:* V. Brice, R. Evans, E. Parsonson, H. Polson, H. Robson.

NORTH SHIELDS. *1st Class:* W. Corni, S. Johnson, T. Richardson, C. Shuttleworth. *2nd Class:* T. Dawson, W. Sutcliffe, J. Tomkinson.

HULL.—*1st Class:* A. Press. *2nd Class:* C. Harding.

LIVERPOOL.—*1st Class:* J. Davies, G. Daymond, G. Mooney, J. Stones, W. Youds. *2nd Class:* J. Barnes, P. Beacroft, E. Kelly, E. Phillips.

GREENOCK.—*1st Class:* W. Renfrew *2nd Class:* W. Boyd, W. Campbell, M. MacPhee, R. Milne, D. Watson.

DUNDEE. *1st Class:* P. Blair. *2nd Class:* C. Millar.

Sept. 18th, 1913.—LONDON.—*1st Class:* A. Millar, M. Suthven. *2nd Class:* A. Corlson, A. Daubney, A. Williams, P. Saval.

LEITH.—*1st Class:* M. Dallas, R. Scott. *2nd Class:* W. Fraser.

GLASGOW.—*1st Class:* J. Graham, W. Lamb, G. McKellar, W. Macphail. *2nd Class:* M. Carlyle, C. Clark, H. Hodge, J. Martin, J. Noble.

WEST HARTLEPOOL.—*1st Class:* J. Buglass, J. Pounder. *2nd Class:* J. Tunstall.

SOUTHAMPTON.—*1st Class:* C. Aitken. *2nd Class:* D. Ferguson, W. Fyfe.

LIVERPOOL.—*1st Class:* N. Esplin, G. Giles, G. Taylor, *2nd Class:* G. Brown, A. Colmar, E. Contreras, H. Gray, S. Ritchie, T. Skinner.

CARDIFF.—*1st Class:* L. Everett, G. Thomas. *2nd Class:* C. Collard, A. Cox, I. Evans, H. Harrison, F. Hennessy, W. Robinson.

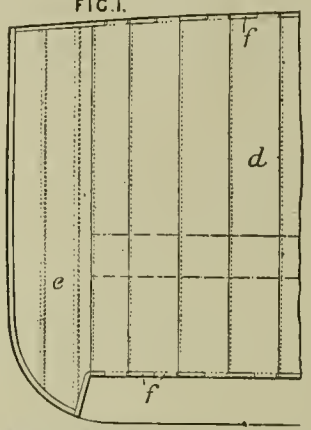
NORTH SHIELDS.—*1st Class:* E. Beedle, E. Brunton, J. Davison, H. Jackson, J. Johnson, D. Robinson, S. Rook H. Treweeks.

Abridgment of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 300, High Holborn, London, W.C.

10,990. Ships' Bulkheads. Zigzag, angled, or corrugated bulkheads *d* are stiffened at about one third of their height by a doubling-strake or a plate or bar, or by overlapping the corrugated plates. The portions *e* of the bulkhead that extend into the wings may be flat, and flat portions may be formed at other parts where required. The corrugated plates

FIG. 1.



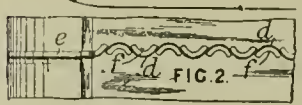
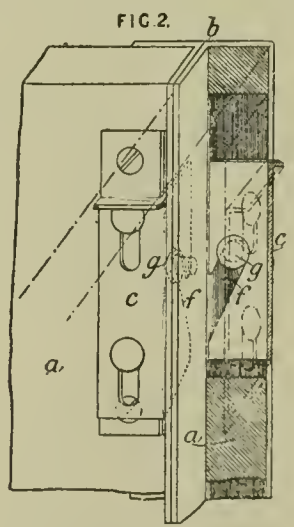


FIG. 2.

may be secured to the decks, etc., by lengths of bar *f* bent to conform to either convex or concave portions; or the plates may be flanged, and the flanges fastened to the decks, etc., the flanges being formed by cutting the plates longitudinally at the angles and bending the edges towards one side or towards opposite sides alternately.

11,807. Ships. Relates to means for securing bulkheads for temporarily dividing cargo spaces into cabins to the stanchions or supports. Fig. 2 shows an arrangement for securing two bulkheads *a*, at right angles to each other, to a T-shaped stanchion, *b*. The ends of the bulkheads are fitted with sliding plates *c* having flanges provided with inclined slots *f* engaging with projections *g* on the stanchion, so that,

FIG. 2.



on driving the plate downwards, the bulkhead is firmly secured between the plate and the stanchion *b*. Each end of a bulkhead is preferably provided with two clamping-members. In a modification, the plate carries a projection engaging with an inclined slot on the stanchion, and in a further modification the inclined slots are dispensed with and the lower end of the member *c* is provided with a wedge-shaped extension engaging with a headed stud on the stanchion.

The Marine Engineer
And Naval Architect.
LONDON, NOVEMBER, 1913.

THE CORROSION OF CONDENSER TUBES.

ALTHOUGH a considerable amount of research has been carried out in dealing with the problem of the corrosion of condenser tubes, the results have not been so satisfactory as one could have wished, for while one investigator propounds one theory and arrives at one result, another propounds another theory and arrives at an opposite conclusion. The Corrosion Committee of the Institute of Metals have recently issued their second report, and the introduction deals with the difficulties of the problem. It may be said that the absence of any rigid basis of experimental test is largely responsible for the great diversity in the results. The Institute adopted the view expressed last year that it is the engineers, who are actually responsible for the efficiency of condensers, who are able to provide the necessary information upon which an opinion can be formed as to the causes of observed cases of corrosion, and in order to secure that such information is not overlooked at the time, it is very desirable that a suitable schedule of queries should be filled in. A list of questions was compiled and sent to members of the Institute, superintendent engineers and others having charge of condensers, but the results were disappointing, in the sense that comparatively few returns were completely filled in. However, a selection of twenty was made which showed points of considerable interest. For instance, there was a variation of from four to twenty-five years in the normal life of a tube, and further, tubes of the same batch from one manufacturer, when placed in different parts of the condenser, gave a corrosion resistance varying from 1 to 3. The nature of deterioration causing the failure of the tube was in nearly every case due to dezincification, *viz.*, the destruction of the zinc constituent by electrolytic action, resulting in a pitted and rotten tube. In a few cases local thinning at the water inlet end was the cause of failure. It was found to be impossible to correlate the failure of the tubes with the presence or nature of the electric lighting plant, and no definite locality of corrosion in the tube or condenser could be determined, although the thinning seemed more prevalent at the tube ends where the cooling water entered. It was found that tubes in land installations using dock, canal or brackish water had a comparatively short life. One of the interesting cases recorded is that of a condenser tube of 70% copper and 30% zinc, which was taken out of a Yarmouth trawler after twenty years' use. There was no sign of dezincification or thinning and the surface was covered with a very hard uniform scale with a looser, finely reticulated layer. The absence of any well marked blue-green layer appeared to indicate that very little copper had been removed, and the tube was practically as thick as when new. The average total thickness of the scale was 0·31 mm., that of the hard lower layer being 0·13 mm.; the latter consisting of oxides of copper and iron and calcium carbonate, no zinc being present. The looser deposit contained considerable quantities of calcium carbonate and sulphate, together with silica and oxides of copper and iron, but no zinc. The thickness was 1·29 mm., and unless it was originally of unusual thickness, it had not lost more than 0·05 mm. in twenty years.

It will be gathered that the selected examples only indicate in a general way the nature of the problem to be attacked, and that further particulars were necessary to deal effectively with the chemical or physical conditions obtaining in a condenser. It was decided, therefore, to deal with possible variations in the conditions from part to part of the same condenser, which might be supposed to cause corresponding variations in the speed of corrosion. The features selected were: the variation of water speed in different tubes; the variation in the temperature in diflerent tubes; the variation in the distance of different tubes from electro-chemical protector blocks, bars and main condenser bodies; the variation in the distribution of solid substances which settle on the tubes; the variation in the distribution and amount of water left in the tubes when the condenser is out of action; the variation in the oxygen contained in solution in the water during its passage through the condenser; and lastly, the variation in the quality of the water circulating through the tubes. It is quite obvious that engineers in charge of condensers are not in a position to supply detailed information as to the exact nature of those conditions which may be expected to influence the course of corrosion. Consequently a complete set of laboratory experiments were arranged and carried out and an experimental condensing plant was constructed and worked, and the results from the two were carefully compared. The agreement between the two methods of work is striking, and in both the order in which the tubes resist dezincification at elevated temperatures has been found to be precisely the same. Both sets of tests bring out the fact that the locality in which dezincification occurs is not determined by the electro-chemical action of carbon or any other foreign particles settling on the tubes, but is due to a chemical action which becomes the more pronounced as the temperature is raised from the ordinary temperature to 50°C. The conclusion deduced from the experiments, which were carried out with natural sea water and ordinary commercial condenser tubes, may be thus summarised. The alloys examined corroded in two distinctly different ways, one of which is characteristic of ordinary atmospheric temperatures, termed complete corrosion, and the other of temperatures slightly elevated, termed selective corrosion. Selective corrosion, which results in dezincification and pitting, and is therefore the cause of the practical problem, must be regarded as an inherent property of the alloys examined, provided that sea water and the requisite temperature conditions are present. The influences of a number of the deposits and particles hitherto supposed to be the causes of dezincification have been shown to be unimportant. The influence of the juxtaposition of two phases in the alloys examined was found to be unimportant. The order in which the alloys resisted complete corrosion was different from that in which they resisted selective corrosion, hence the resistance to selective corrosion cannot be deduced from observations on the resistance to complete corrosion at the ordinary temperature. The experiments with the model condenser plant confirmed the results

obtained in the laboratory experiments. Preliminary observations have been made upon the mode of action of electro-chemical protection, and attention has been directed to the deposition of calcium carbonate scale on protected tubes.

To come now to the practical side of the question as to the best course to adopt to reduce corrosion to a minimum, the report concludes with the following general recommendations. To prevent or at any rate, to postpone dezincification: a suitable supply of water should be used, an alloy different from brass should be employed, the temperature conditions should be adjusted when using brass, and electro-chemical protection should be employed. As to the first, it is impossible in the mercantile marine, and can rarely be used on land, and as to the second, the obvious suggestion is to lower the amount of zinc in the alloy. No indication is given as to how far this can be carried, but the total removal of zinc would bring serious trouble of another kind. It is possible some alloy, intermediate between 70 : 30 brass and pure copper, would give greater resistance to corrosion than either, though the satisfactory drawing of such a tube is another matter. The temperature of the water in the condenser can be kept down by either limiting the amount of steam to be condensed or by shortening the path of the water through the condenser, or by increasing the speed of the water or by preventing the choking of the tubes, either by fitting screens or by frequent cleaning. It may be stated that the extremely long life of the tubes in the Yarmouth trawler referred to was probably due to the normal easy steaming condition of service, and hence the weight of steam condensed per unit of surface was very small and the condenser temperature was low. As to shortening the path of the water, it is pointed out that dividing a condenser into two nests is a distinct aid to corrosion. As the water passes through the lower nest it becomes heated, and consequently the top nest is supplied with water that is already warm and which will become still more highly heated. From the corrosion standpoint it would be best to introduce a separate water inlet and outlet to each nest of the condenser and to discontinue the practice of building them in nests, especially since the condensing efficiency of the lower nest tubes is small. As to the speed, that of the experimental plant was 275 feet per minute, but it is thought advisable to recommend that 360 feet would be more suitable. The report is a vastly interesting document, and only a brief summary of the matter can be set out here, but anyone desiring to study the subject cannot do better than digest the report in its entirety.

THE CHANNEL TUNNEL

THE subject of the construction of a tunnel under the Straits of Dover comes before the public periodically at intervals of varying lengths and under various conditions. Recently it was the subject of consideration at the first Annual Congress of the Franco-British Travel Union, when Baron Emile D.'Erlanger, the chairman of the Channel Tunnel Company, presided, and gave a history of the subject in his opening address. There followed later a paper on the subject by Sir Francis Fox, a member of the firm of civil engineers who have reported on the proposal on the basis of the latest experience. As a matter of history it is interesting to note that the first proposal for a tunnel was made as early as 1802, by a French mining engineer, to Napoleon Bonaparte, followed by another proposal in 1859, which was revived again in 1867, and formed the basis of the formation of the Channel Tunnel Company in 1883, who deposited a bill in Parliament, which was rejected on military grounds by a select committee in July the same year. Before this date a gallery had been bored on the English side for 2,300 yards and on the French side for 2,009 yards under the bed of the Channel, but the work was stopped in 1883, and has never been recommenced owing to the want of Parliamentary powers. The engineers now suggest that the work of constructing two single track main tunnels, each of 18 feet diameter and a drainage heading 12 miles under the Channel bed, together with the necessary works, would cost eight millions of money and take more than four years to carry out. A similar amount of work would have to be carried out from the French side on an equivalent basis. A good deal of criticism has been levelled at the scheme from time to time from the military point of view, but we feel sure that on careful consideration the question of being able to render the tunnel useless at the shortest notice can be readily answered, and any real opposition rests on entirely different grounds. Therefore, leaving the military question on one side altogether, let us turn to the point as to whether an adequate return can be obtained by the expenditure of sixteen millions of capital and a fairly heavy annual expenditure for maintenance and working. Weighing up the relative merits of present-day over-sea and prospective underground transit, we have come to the conclusion that the advantages of the latter would be outweighed by the cost of providing them as far as our present knowledge goes. We therefore think that the Channel Tunnel scheme will receive no more support now than it has done for the past thirty years, and much more support would be necessary before Parliament can be expected to change the view it registered in 1883.

MR. ALEXANDER GRACIE, M.V.O., delivered the "James Forrest" lecture for 1913 on October 23rd. The lecture, which was a very interesting one, had for its subject the progress in marine construction during the last twenty years.

ROYAL INDIAN MARINE.—We have received intimation that owing to the retirement of several of the engineers of the Indian Marine, there are vacancies for appointments, for which applications are invited. The candidates must be within the limits of twenty-one and twenty-five years of age. The age of retirement on pension is fifty-five. The possession of a first or second-class certificate is necessary, along with testimonials from past and present employers and a continuous statement of service and experience prior to date of application. The four chief engineers after service as chief engineer, over five years, where such service has been of special merit, receive on selection a pay of 400 rupees per month; other chief engineers receive 350 rupees per month; engineers, junior to chief, receive, according to service, from 325 rupees to 150 rupees. There are certain allowances given according to the i.h.p. of the steamers in which the engineers are on active service, rating from 500 to 750 i.h.p. one rupee eight annas per day, up to 9,500 i.h.p. and over, eight rupees eight annas per day. There are fourteen shore appointments in India open to engineers of the Indian marine. Leave is granted on full pay at the rate of sixty days per annum. Applications should be made to The Director of the Royal Indian Marine, India Office, Whitehall, London.

INSTITUTE OF MARINE ENGINEERS.

The Foundation Stone of the new premises of the Institute of Marine Engineers, situated at the east side of Tower Hill, London, E.C., was laid on October 29th, by the Right Honourable the Lord Mayor of London (Sir David Burnett), who was attended with the Sheriffs. It is expected that the building will be ready for occupation in March, 1914. The few particulars of the history and objects of the Institute which we append herewith, will consequently be of interest to our readers.

Towards the close of 1888, several marine engineers met from time to time and discussed the question of the formation of a Scientific Society for Marine Engineers. A committee was formed and an organizing secretary was elected, who drew up a circular setting forth the objects of the proposed Society. The main points of this circular were afterwards embodied in the Articles of Association and Bye-laws, when the Institute of Marine Engineers was incorporated in July, 1889, only six months after the opening meeting—an unprecedented event for such a Society. The Hon. Organizing Secretary was elected Hon. Secretary, and he has been elected annually to this office by the votes of the members. In February, 1889, a Reading Room was opened in Stratford, and arrangements carried out for the reading of papers. The Institute dates its birth from February, 1889, and its inception from October, 1888.

The objects of the Institute, as set forth in the Articles of Association, are as follows:

(a) To promote the science and practice of Marine Engineering in all its branches.

(b) To enable Marine Engineers to meet and to correspond, to facilitate the interchange of ideas respecting the improvements in, and original and improved methods of working machinery, and the publication and communication of information on such subjects.

(c) To maintain and improve the status of Marine Engineers and the profession of Marine Engineering, to afford facilities for education, study and self-culture to Marine Engineers, and to promote their progressive advancement in a knowledge of their profession.

The grades of membership cover the total experience necessary for the marine engineer, embracing apprentices, junior engineers, draughtsmen, chief engineers, works' managers, and all positions of responsibility in connection with marine engineering. The fees are graduated to the positions held, as Graduates, Associates, Associate Members, Members and Companions.

By means of donations, including £250 from the well-known shipbuilder, Dr. P. Denny, to bear a 4 per cent interest for a gold medal each year, freehold premises were acquired in 1892, at Stratford. Since then the work of the Institute has been carried on in these premises. A Reading Room and Library with 1,500 volumes, Museum, Fuel Testing Apparatus, Billiard Room, Juniors' Room and Lawn Tennis Club are available for the use of the members. In the Lecture Hall, meetings are held fortnightly in the winter session, when papers are read and discussions held on subjects bearing on marine engineering practice. The transactions are issued in monthly parts and are posted to members all over the world. The transactions embrace the papers read, with the discussions thereon, reports of visits to works made during the summer, excerpts from reports, lectures and papers of special interest to marine engineers. Since February, 1889, the number of papers read before the Institute amounts to over 200, in addition to which many illustrated lectures have been delivered and demonstrations given.

Although the membership fees are smaller than those of any kindred institution, the finances of the Institute have been so carefully managed, without stinting the main essentials in any degree, that the revenue account balance is about £3,800, due to gradual and regular deposits each year.

In the earlier years, classes for Graduates and Junior Engineers were held in the evenings, but the erection of a Technical School in the neighbourhood rendered these unnecessary. Subjects for papers to be written by the Juniors, Graduates, Associates and Associate Members, are set, and awards given to competitors whose papers are considered worthy. There are two scholarships of £50 each for two years, given under the auspices of the Institute, by Lloyd's Register of Shipping. The awards are judged from examinations held annually.

The Institute has been closely associated from its incorporation with exhibitions, conferences, committees—government and otherwise—for the advancement of the marine engineer and marine engineering, and has ever been recognised as a representative society, whose views were worthy of consideration, and whose advice was valuable. The social side of the Institute has been highly appreciated, and means of helping cases of distress in connection with deceased members of the engineering staff of steamers—whether members of the Institute or not—have been fostered and made use of from the inception of the Institute. Many widows and orphan children have been assisted through the instrumentality of Benevolent Societies and Orphanages.

The *Titanic* Engineering Staff Memorial Fund, amounting to £2,866 10s., subscribed to by members and friends all over the world, will further be available as a benevolent fund to assist cases. £300 of the amount received was devoted to the erection of a memorial at Southampton, and £50 is reserved for a similar purpose, to take the form of a tablet in the new premises of the Institute, now in course of erection on Tower Hill.

The cost of the new premises will be £9,500; towards this £8,000 has been subscribed, and when the building is ready for occupation at the end of March, 1914, it is hoped that not only will the £9,500 be fully subscribed, but a further substantial amount received in donations to form a guarantee fund to assist in defraying the extra annual outlay involved, and to form the nucleus of a fund for the redemption of the capital expended on the building, which is on leasehold property.

THE ELECTRIC SHIP "TYNEMOUNT."

THE electrically-propelled cargo vessel *Tynemount*, launched this year on the north-east coast by Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Wallsend-on-Tyne, to the order of The Electric Marine Propulsion Co., Ltd.—a company formed to develop the system, associated with the name of Mr. H. A. Mavor—has now run her preliminary trials, which proved quite satisfactory. All the trials, so far, have been carried out on light draught only, and we are informed that further trials will be conducted when the vessel is loaded and about to sail. In addition to the particulars of the vessel given below, taken from information supplied by the Electric Marine Propulsion Company, we refer our readers to the July issue of THE MARINE ENGINEER AND NAVAL ARCHITECT, where considerable information relating to the vessel is given in a paper on "Electric Propulsion," by Messrs. John Reid and H. A. Mavor, read before the Institution of Naval Architects in June this year and reported in the aforesaid July issue.

The *Tynemount* is intended for service on the canals and great lakes of North America. She is 250 ft. in length by 42 ft. 6 in. beam and 19 ft. depth moulded, and has been built to the classification of the British Corporation B.S.* The vessel has two masts, forecastle and navigating bridge forward, and poop aft. There is one steel deck and three cargo holds, with seven large hatches. On the deck are steam winches for working the cargo with three 3-ton derricks. The deck machinery consists of steam windlass, steam steering gear and the three steam winches for working cargo and warping. Electric light is fitted throughout. This auxiliary machinery is supplied with steam from two Cochran donkey boilers, placed in the poop and fired by means of oil fuel.

The vessel has a double bottom throughout, with heavy flush-fitted tank-top plating; under the cargo holds the double bottom is adapted for carrying water ballast, as is the forepeak, whilst the tank under the engine room and the after-peak may be used for oil fuel. There are also two tanks for oil fuel on the deck forward of the poop bulkhead. In the forecastle is the accommodation for the officers, crew and oilers, whilst above are the captain's sleeping room and his office, together with wheel-house, etc. In the poop are the rooms for the engineers, the galley, the dining saloon and the crew's mess room. Among other special features may be mentioned a strong oak fender along the sides of the vessel and forward, for protection in the locks, a strong oak quarter badging round the stern, "wrecking wells," *i.e.*, vertical trunks to give access from the deck to the double bottom when the holds are full of cargo, bowsprit for steering, etc.

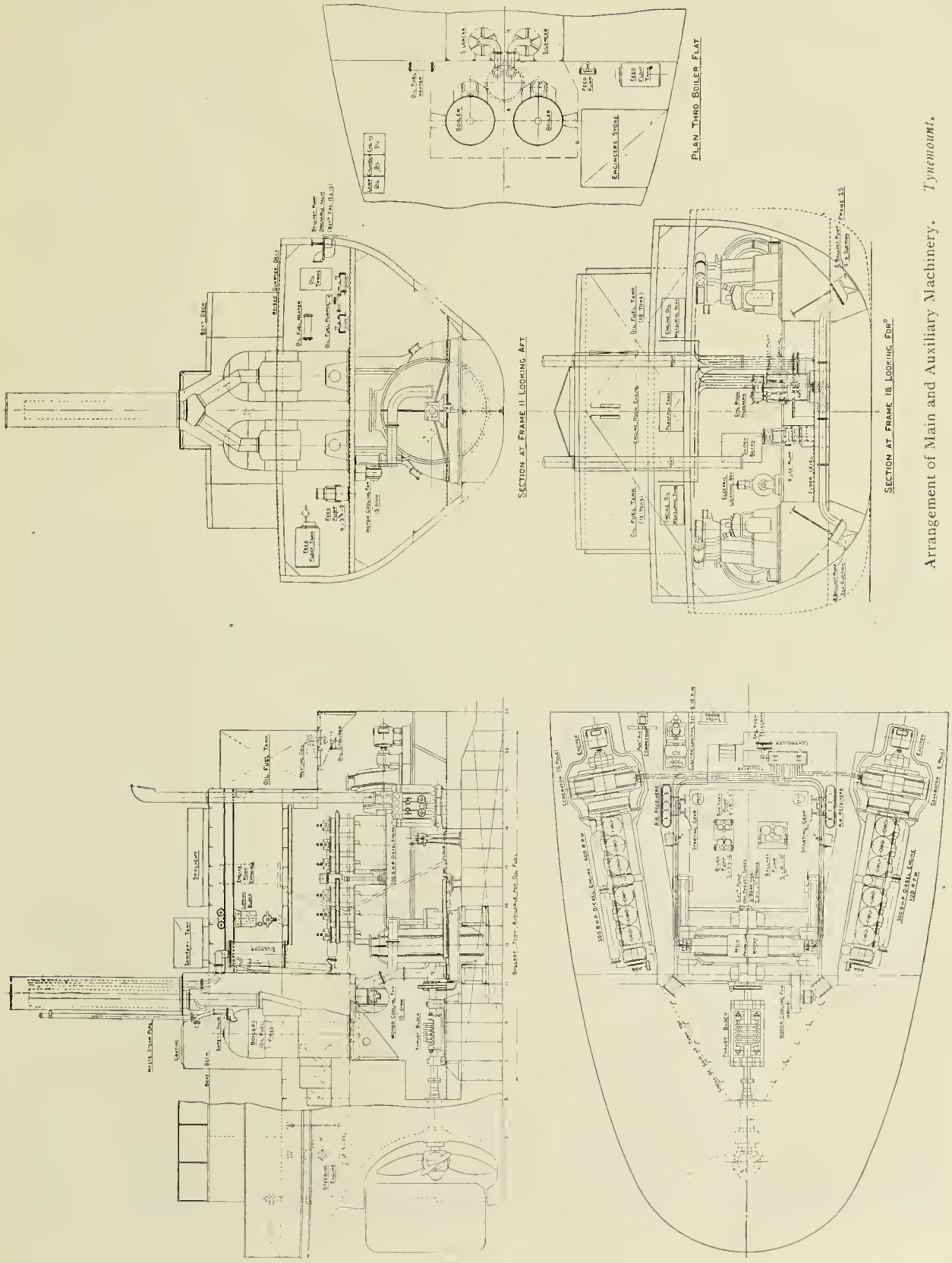
The machinery is accommodated right aft under the poop.

The prime movers of the installation consist of two six-cylinder high-speed engines of the well-known "Mirrlees-Diesel" type, as manufactured by Messrs. Mirrlees, Bickerton & Day, Ltd., Hazelgrove, near Stockport. They are each capable of developing 300 b.h.p. at 400 revolutions per minute on the four-stroke cycle, the diameter of the cylinders being 12 in. and the stroke 13½ in. The engines are totally enclosed, forced lubrication being employed throughout. A substantial bed-plate, cast in two pieces and bolted together, is joined with the alternator bed-plate at the fly-wheel end of each engine, the whole being secured to the raised engine seatings, which form part of the ship's structure on both port and starboard sides of the engine room. The six cylinders of the engine are divided into two groups of three cylinders each, the vertical shaft which drives the cam-shaft being placed between the two groups. The crank-shaft is made in two pieces, the gear wheel which transmits the motion to the vertical shaft being bolted between the two flanges of the central coupling, and these flanges are turned solid with the shafts.

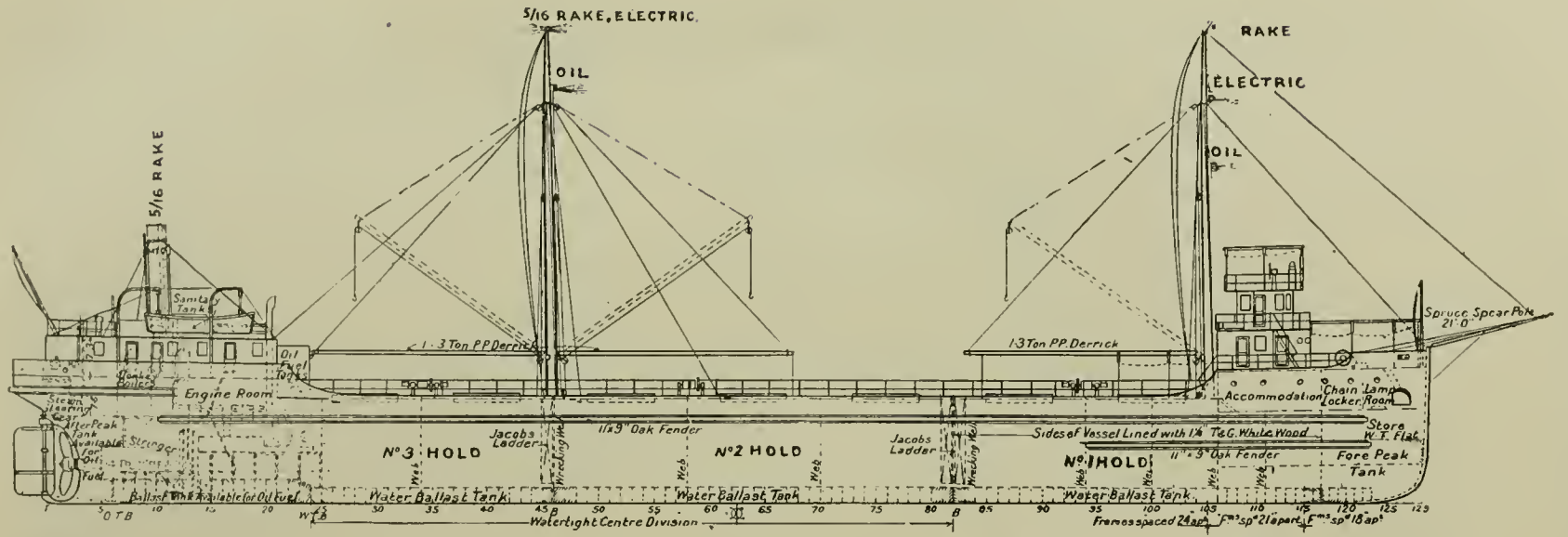
The engines, which are coupled to the alternators in the usual manner are placed on the forward end of

Photo, Frank & Sons, South Shields.

The Electrically-propelled Cargo Vessel *Tynemount*. Length, 250 ft. Beam, 42 ft. 6 in. Depth, 19 ft. mld.
Built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., for The Electric Marine Propulsion Co., Ltd.



Arrangement of Main and Auxiliary Machinery. *Tynemount.*



HOLD CAPACITIES

Space	Frames	Gross cub. ft.	Nett cub. ft.	Wheat Bushels	Coal Tons
No. 1 Hold	82'117	40800	40600	33850	1015
,, 2 ,,	46'82	50700	48900	42050	1224
,, 3 ,,	25'46	29400	28300	24400	706
Total Cargo		120900	117800	100300	2945

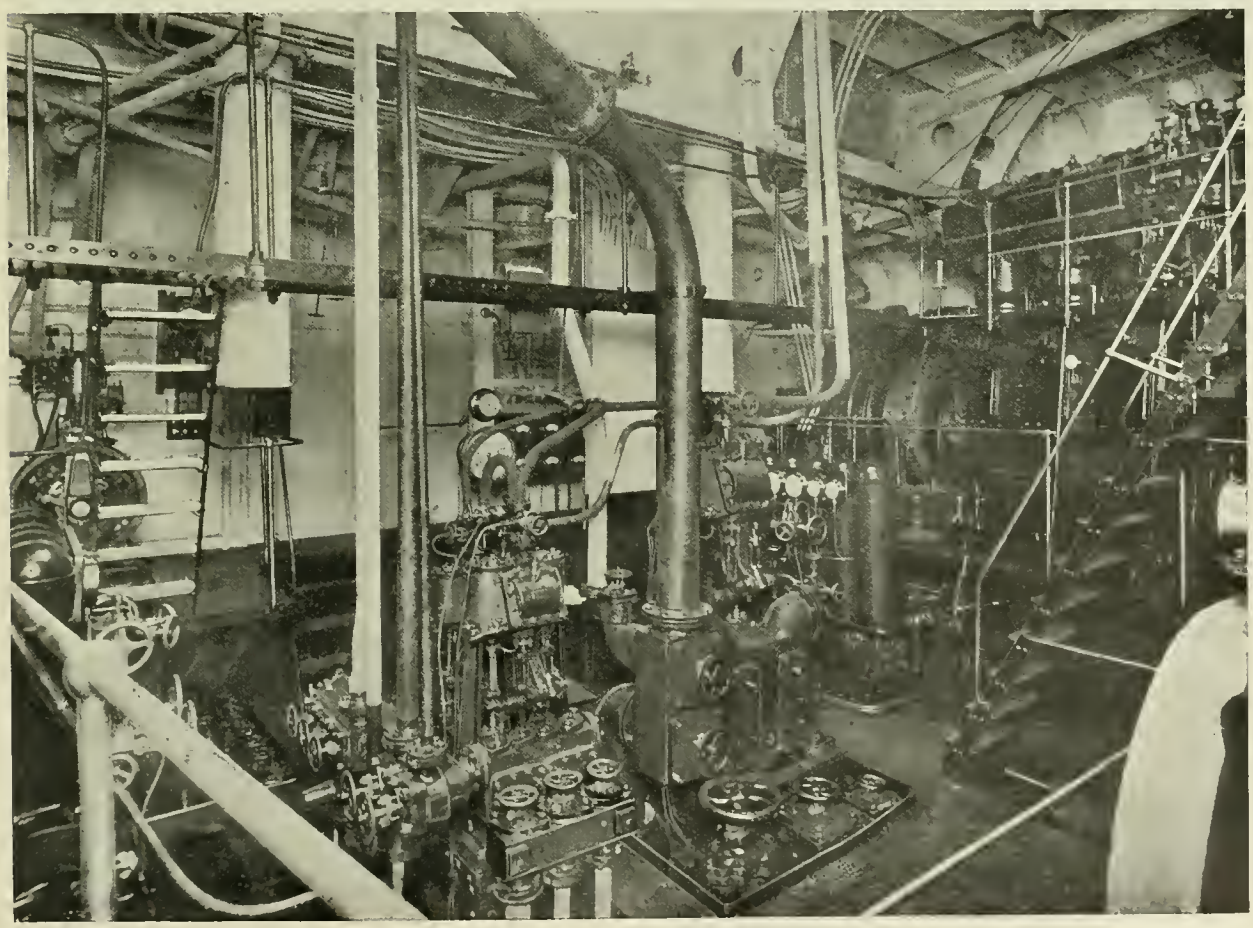
Oil fuel tanks—Deck tank (aft.) 40 tons, Aft-peak tank (reserve) 20 tons, E.R. tank (reserve) 69 tons. Total, 129 tons.

General Arrangement of the *Tynemount*.

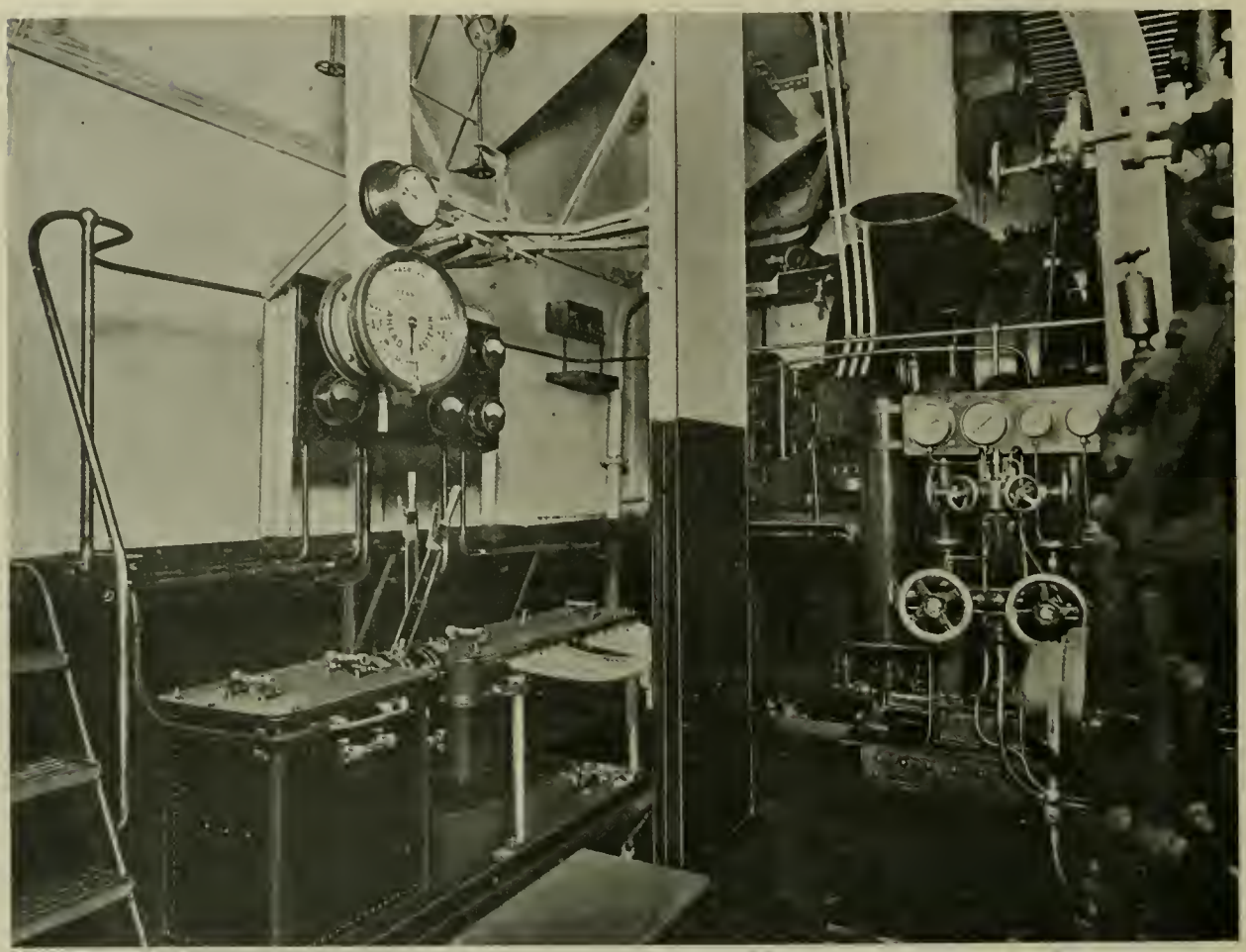
the machinery space, on the port and starboard sides. A suitable hand lever barring gear, working in an internal rack on the fly-wheel of each engine, provides for turning the engine when required into the starting position. Starting is effected by means of compressed air, three cylinders only being fitted with starting valves. These are arranged on the three cylinders at the fly-wheel end of the engines, and their operation is rendered easy for the engineers in charge by a system of bell crank levers and coupling rods transmitting the motion from a control pillar placed on the engine room floor, in close proximity to the air receivers of the engines. A device for stopping the engine and means of controlling the amount of air delivered by the air compressor are also provided on the same control pillar. Near at hand is the electric controller of the transmission system, the whole providing a compact and centralized arrangement for the operation of the propelling machinery. At the after end of each engine, a three-stage air compressor is fitted, direct driven from an extension of the engine crank-shaft. This extension also provides means for driving the lubricating and circulating water pumps.

The two groups of cylinders comprising each engine are carried by the two enclosed-type columns, each cast in one piece and provided with inspection doors of ample size. To these columns on the front or cam-shaft sides of the engines cast-iron brackets are fixed, which support grating platforms running along the whole length of each engine on the front side; these platforms provide easy access to the valve gear and valves. The valves are situated in the cylinder covers, the fuel valve being of the ordinary needle type, opening vertically upwards; the exhaust and air valves open downwards, and all are operated by cams and levers in the usual way. An important feature of these levers is the provision of a hinged and bolted joint in each, which allows, by the undoing of one bolt, any lever to be folded back, and, by this means, the work of withdrawing the valves is reduced to a minimum. All the valve seats are made separate from the cylinder covers, and can be withdrawn bodily with the valves. Spare valves and seatings are carried, and thus all grinding-in can be done on the bench at the engineer's convenience. The pistons are of the trunk pattern and have separate heads, and the top ends of the connecting rods are fitted with gun-metal bushes working on case-hardened piston pins.

The fuel pumps, for delivering oil to the cylinders, are situated on either side of the vertical shaft gear casing, and are driven by eccentrics from the cam-shaft. Each of these eccentrics operates a small crosshead, to which are fitted the three plungers of each pump. Fuel oil is fed by gravity to the fuel-pump suction chamber from the ready-use tanks,



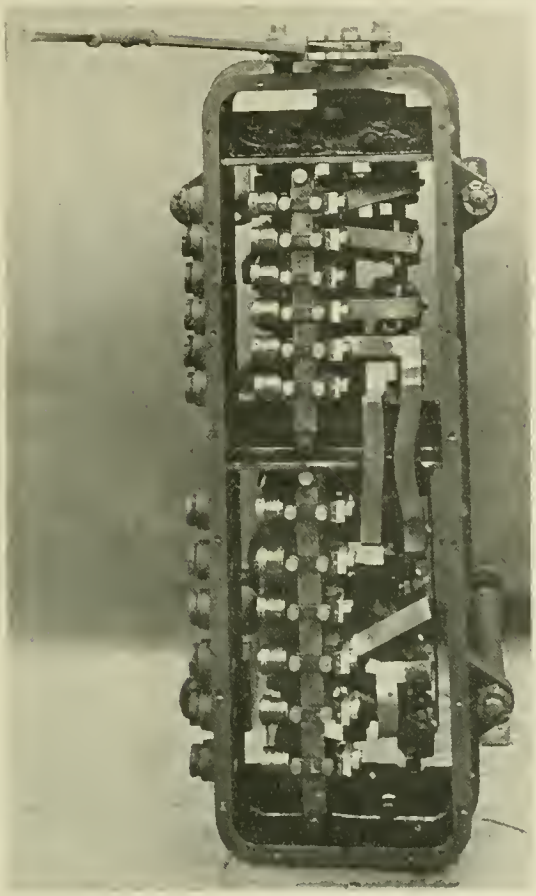
View of Engine Room, starboard side, showing one Generating Set.



View of Engine Room, looking forward, showing Switch Gear on left. The handling of the ship can be carried out by means of the two levers, which are so interlocked as to be practically fool-proof.

which are situated on the forward bulkhead of the engine room. The amount of oil passing to the cylinders is determined by the governor, which is fitted on the upper portion of the vertical shaft ; a system of coupling rods and levers is connected from the governor arm to a small spindle passing through the fuel pump suction chamber, and to this spindle tappets are fixed, which determine, according to the position of the governor, the length of time the fuel-pump suction valves remain off their seats, and until the suction valves are closed no oil will be delivered to the fuel valves on the cylinder covers. The circulating water, after passing through the engines, goes to the exhaust pipes, which are water-cooled. Thence it passes from each engine, through a water-flow indicator, into a branch piece, from which two pipes are led, one pipe going to the discharge valve on the ship's side, and the other, by means of a bye-pass, to the suction side of the circulating pump. By this means warm water can be mixed with the incoming water from the weed traps when the ship is sailing in cold waters. When the ship is running in fresh water it will be possible, by means of a special arrangement, to pass the hot circulating water from one engine into the feed tank of the donkey boilers.

Exciter Switch removed out of case.

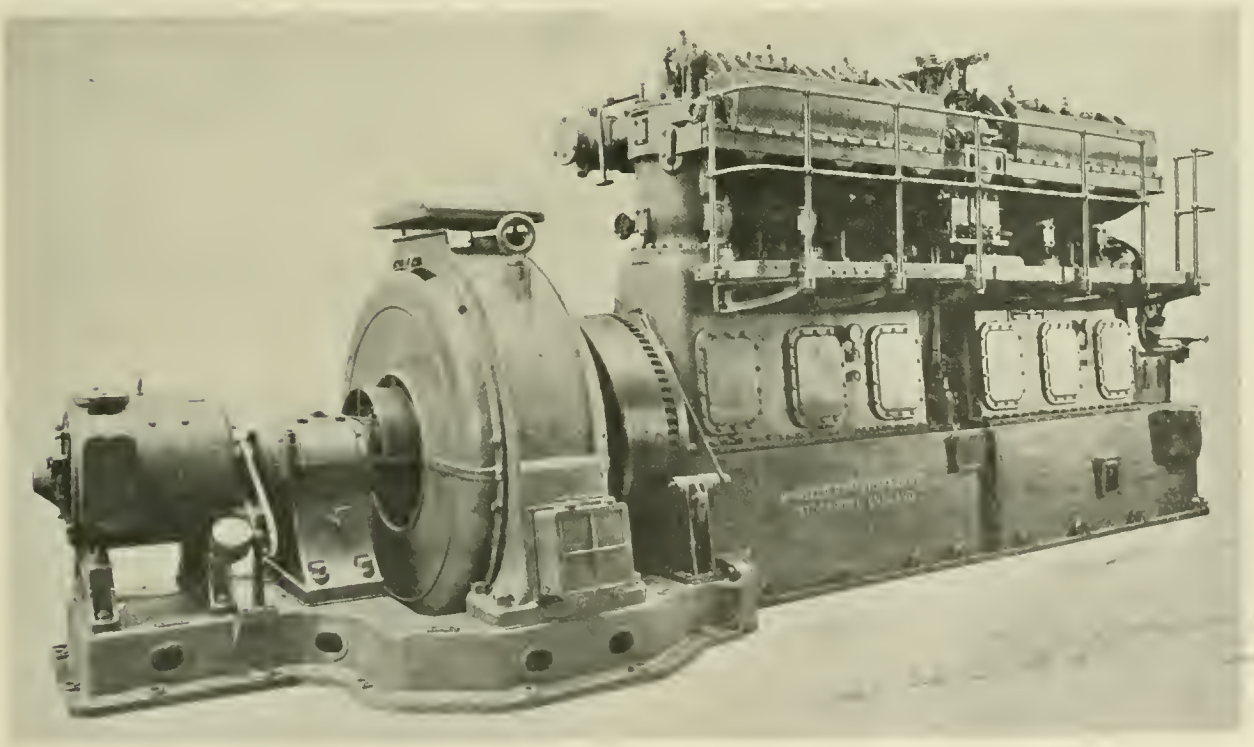


Main Switch. Cover and Oil Tank removed.

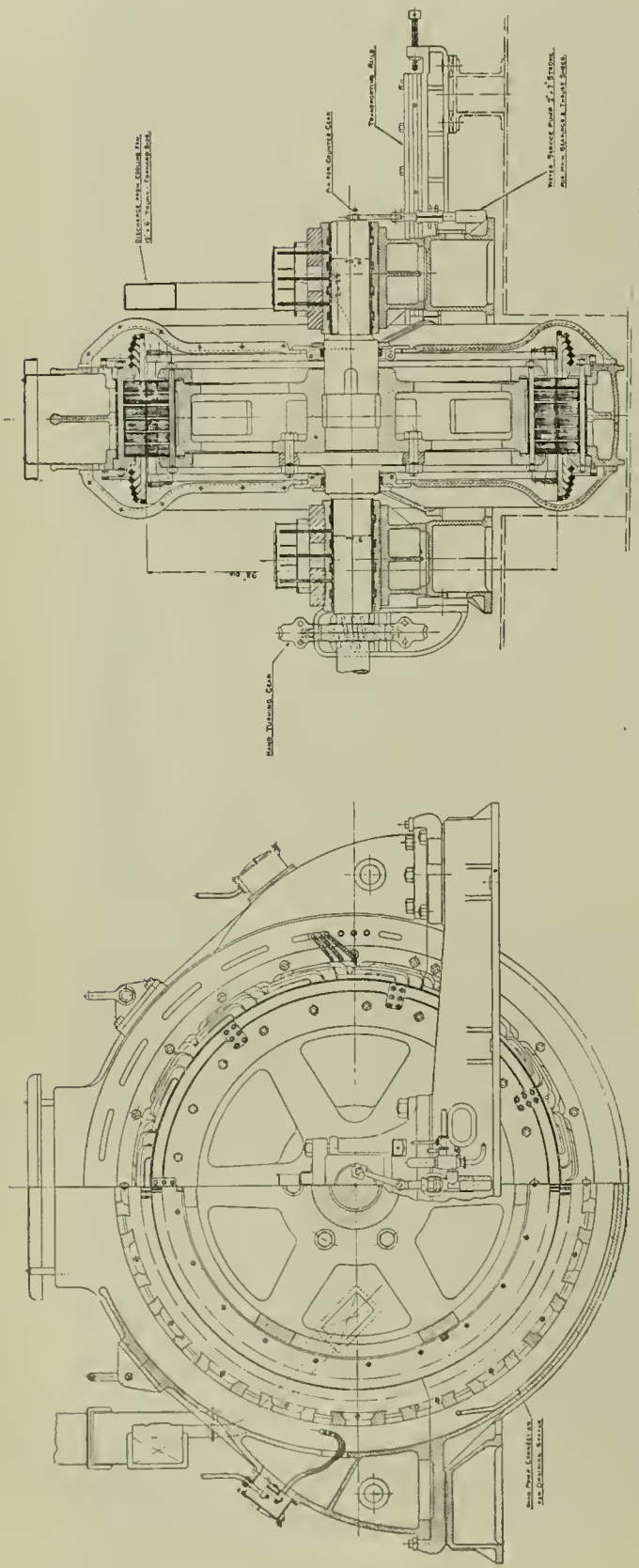
When the engines have been stopped and are cooling down, it has been arranged that the sanitary pumps may pass circulating water through them, and thus lessen the chances of precipitation of salts or alkaline matter in the jackets.

The electrical equipment consists of two Mavor and Coulson three-phase alternators, each direct coupled to one of the Diesel engines. The alternators, when running at their normal speed of 400 r.p.m., each gives an output of 500 volts. and 270 amps. per phase, which absorbs the full power of the engine. They are provided with six and eight poles respectively, making the frequency of the current 20 periods per second, and 26·6 periods per second respectively. An exciter is direct coupled to each alternator, and is capable of giving an exciting current of 30 amps. for ample working, which can be increased up to 50 amps. whilst manœuvring. The current from these two generating sets is led to a 500 b.h.p. Mavor & Coulson patent induction motor of special construction. The rotor of this motor is of the squirrel-cage type, but the stator is provided with two different and entirely separate windings, one of 30 and the other of 40 poles. When these two windings are supplied with current at 20 and 26·6 periods respectively they give the same synchronous speed of 80 revs. per minute. The motor will then absorb the full power of both engines, and drive the propeller, to which it is direct coupled, at a speed of 78 revs. per minute. This propeller speed corresponds to the fastest speed of the vessel.

In order to obtain a slower speed the connections are altered, so that the alternator giving 20 periods supplies the 40-pole winding of the motor; the alternator, giving 26·6 periods can be shut down, and the



Combined Generating Set. The Diesel Engines are by Messrs. Mirrlees, Bickerton & Day, Ltd., Stockport.

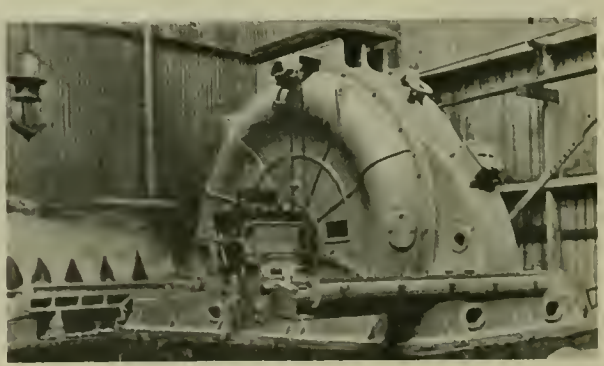


Sectional arrangement of a specially constructed Mavor & Coulson Motor for the *Tynemount*. 500 S.H.P. 78 R.P.M. loaded.

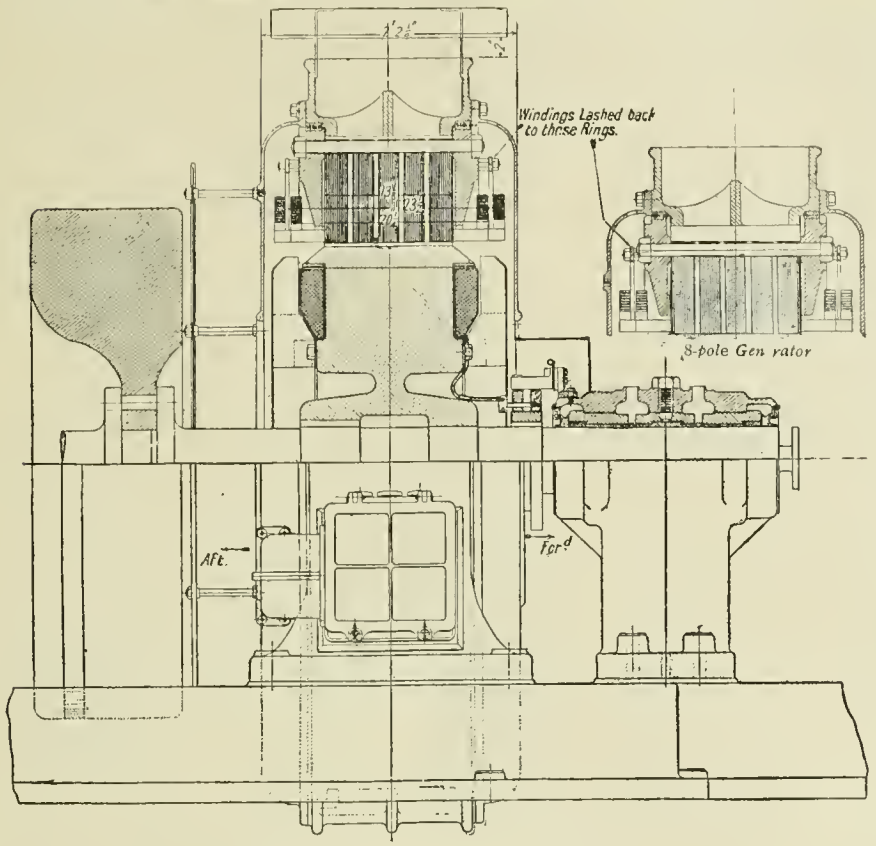
30-pole winding of the motor is also out of use. The synchronous speed of the motor with the propeller is now reduced to 60 revs. per minute. One of the engines only is available, but, as the speed of the ship is reduced to about three-quarters of the normal, half of the total h.p. is ample, and the great advantage is obtained of being able to entirely shut down that part of the plant which is not required at the low speed. It will be noted that the two alternators, when both are at work, are connected to entirely separate circuits, and they are therefore never run in parallel. (The paralleling of two alternators, necessitating that they should be run up to speed and synchronised before being switched on to the load, is quite unsuitable for ship work; this operation not only requires skill and care, but would involve considerable delay in starting the propeller motor). The motor is readily reversed by interchanging the connections of two of the phases.

The switch gear, by means of which the necessary changes of connection are made, is extremely simple; it consists of two parts—a main switch of the tram way-controller type having five different positions, full ahead, half ahead, stop, half astern, full astern; and of a second switch, the purpose of which is to introduce resistance into the shunt circuit of the exciter. The contacts of both switches work under oil, but it is inadvisable that the contacts of the main switch should be required to break the large main current flowing to the motor. The two switches are, therefore, interlocked, so that it is impossible to work the main switch except when all the resistance has been introduced into the exciter field coils. There is then practically no excitation and the whole system is "dead." With the resistance in the exciter field circuit, the main switch can be moved to any one of its four working positions, and when the main connections have been made for the new running position the shunt switch lever is pulled over so as to cut out the resistance and restore the excitation. Until the main switch is definitely on one set of contacts the shunt switch is locked, so that the excitation cannot be restored.

It will be seen that the whole handling of the ship can be carried out by means of two levers, which are so interlocked as to be practically fool-proof. In the present instance these switches are in the engine room, but it is evident that by lengthening the connecting cables they could be placed on the navigating bridge. The number of electrical instruments pro-



The propelling motor of special construction.



Sectional arrangement of Generators.

IDEAL-HOME EXHIBITION.—The spirit of enterprise which resulted in the exhibition held at Olympia during October deserved the success accorded to it by the large number of visitors who attended and admired the display provided for their delectation, many of the exhibitors we noted receiving orders for goods which possibly might not have reached them in the ordinary course of business. The only exhibits of a character to call for scrutiny from a marine engineering point of view were, the protective paints, the machines and special materials for reducing labour and adding to the comfort of life on ship board in respect to passengers and all hands. Of the former was the exhibit by Messrs. Gay, who had a water-wheel at work with white paint running in the water course, and some samples of their excellent colours on wood, while in their descriptive catalogue references were made to the services rendered by their anti-corrosive paints for steel work structures, ships and boats. The vacuum cleaners were much in evidence and the many varieties gave a wide choice to intending purchasers. These cleaners are gradually being adopted for passenger steamers, and are of considerable service. Other appliances for cleaning silver and other metals, leather, etc., were exhibited, and their merits shown by results. Altogether the exhibition was certainly a success from a visitor's point of view.

vided has been kept down to a minimum. There are provided only one ammeter and one voltmeter for each alternator, and an ammeter and voltmeter for each exciter. The handling of the switch-gear is so simple that there is no necessity for multiplication of measuring instruments. The electrical drive permits the speed of the ship to be altered without altering the engine speed. It also permits a convenient gear ratio to enable the engines and the propeller respectively to be run at their most efficient speeds, and also provides for the ready reversal of the propeller while the engines continue to run in their normal direction. In addition to the above advantages it is found that in many cases the system allows of a reduction in the machinery space and also in the bunker space required, thus increasing the cargo capacity of the vessel. As a subsidiary advantage it lends itself readily to distant control, and, in any case where it may be found advisable, the switch-gear can be placed on the bridge, and the control of the motor driving the propeller be put into the hands of the navigating officer.

MESSRS. RONALD TRIST & CO., LTD.—In connection with the excellent handbook, recently distributed by this firm, describing their well-known "Thermo Feed" patent system of feed regulation, and which was reviewed in last month's issue, it should be borne in mind that the "Thermo Feed" arrangement maintains the water level to within a maximum variation of $\frac{1}{8}$ inch in Lancashire boilers and in water-tube boilers to within $\frac{1}{4}$ of an inch.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

THE launch of the *Queen Elizabeth* on October 16th adds a notable vessel to the long list of famous warships which have been put afloat at Portsmouth. Being the premier yard, the name-ship of a type has been generally built here, and thus a succession of vessels, each varying from her predecessor, and each embodying new ideas and features, has left the slips in later times annually. But the *Queen Elizabeth* is particularly notable as the first battleship to use oil fuel only, a departure now made tentatively, but one that is sure to be followed extensively later on. The *Queen Elizabeth* will also carry 15-in. guns, ten of these firing a projectile of 1,950 lbs. She is also, it is reported, to be protected against attack from overhead with a battery of anti-aircraft guns. It was very pleasing to everyone in the yard that the ship should be named by Lady Meux, the wife of the Commander-in-Chief, because this lady also laid the first keel-plate on Trafalgar Day last year. Not only does the *Queen Elizabeth* show a great advance in design, but she is the heaviest warship ever put afloat at Portsmouth, over 10,000 tons having been built into her on the slips. The ceremony was most imposing, and the launch successful in every way. Preparations are already being made for beginning the new battleship, which is to be named the *Royal Sovereign*, and for which a sum of £215,346 has been allotted in the Estimates of 1913-14. The last *Royal Sovereign* built in this yard was floated out of dock at the touch of a button by Queen Victoria in February, 1891, and on the same day the cruiser *Royal Arthur* was launched. It is not yet publicly known what the new *Royal Sovereign* will be like, but she will burn coal as well as oil, and it is probable that she in her turn will show some advance upon the *Queen Elizabeth*. Her plans have been received in the mould loft, and as no alteration or exten-

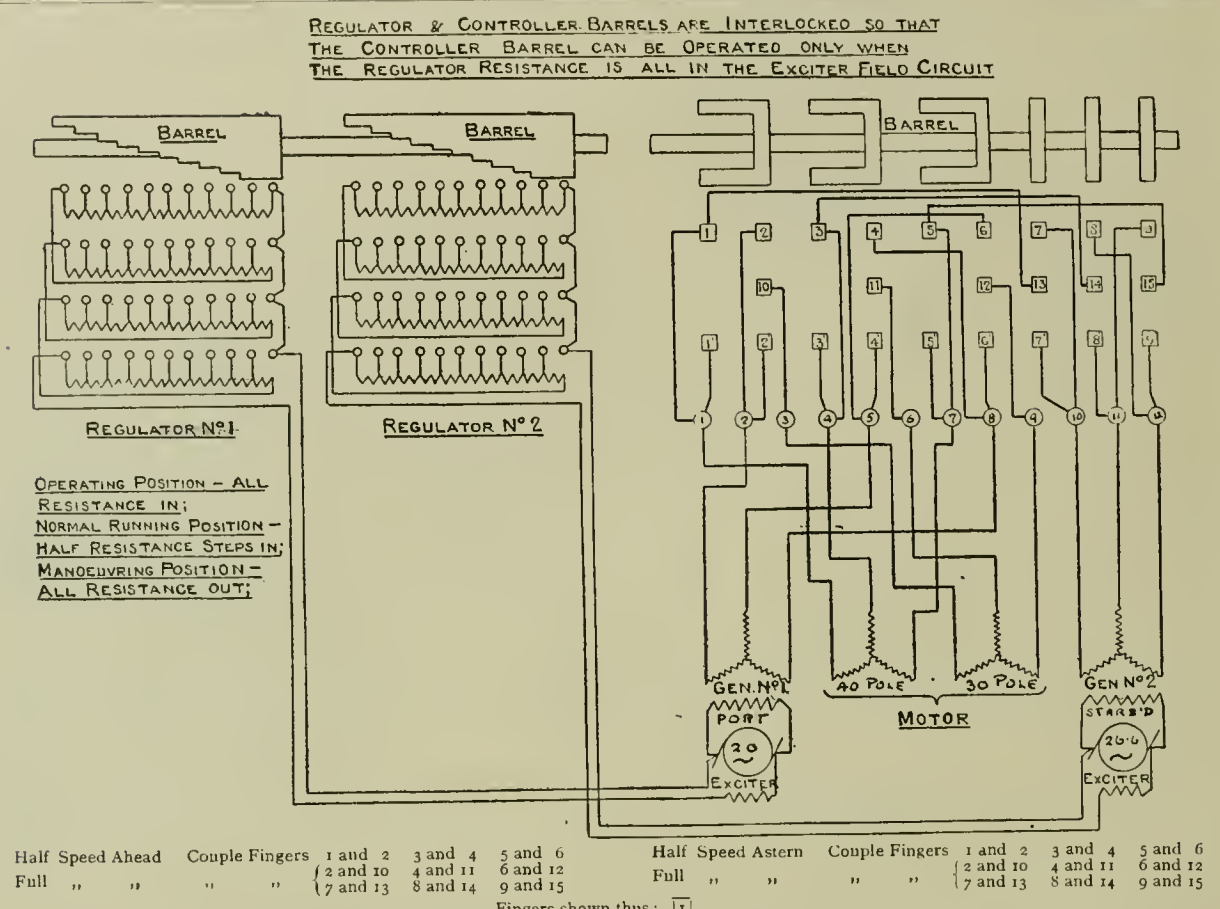

REGULATOR & CONTROLLER BARRELS ARE INTERLOCKED SO THAT THE CONTROLLER BARREL CAN BE OPERATED ONLY WHEN THE REGULATOR RESISTANCE IS ALL IN THE EXCITER FIELD CIRCUIT
BARREL
BARREL
BARREL
REGULATOR Nº1
REGULATOR Nº 2
OPERATING POSITION – ALL RESISTANCE IN;
NORMAL RUNNING POSITION – HALF RESISTANCE STEPS IN;
MANOEUVRING POSITION – ALL RESISTANCE OUT;
GEN. Nº1 PORT
40 POLE
30 POLE
MOTOR
GEN Nº2 STARB'D
20
26·6
EXCITER
EXCITER
Half Speed Ahead Couple Fingers 1 and 2 3 and 4 5 and 6
Full " " " " 2 and 10 4 and 11 6 and 12
7 and 13 8 and 14 9 and 15
Half Speed Astern Couple Fingers 1 and 2 3 and 4 5 and 6
Full " " " " 2 and 10 4 and 11 6 and 12
7 and 13 8 and 14 9 and 15
Fingers shown thus: 1

Diagram of Connections for the *Tynemount*.

sion of the slip will be necessary it is strange if she is not begun very shortly, although there has been a rumour that she will not be laid down before January. The long-expected Admiralty replies to the workmen's petitions have now been received. The concessions are few, but this perhaps might have been anticipated, as many important matters were dealt with in the pay circular issued in May last. An increase is to be made in the numbers of the established workmen, and steps are to be taken to select men to fill the additional vacancies in accordance with special directions, which have been issued to the several superintendents. No great change is to be made in the system of presenting petitions, but in future all matters of a personal character must first be submitted to responsible local officers. This plan does not appear to give entire satisfaction, but a right to appeal is also given as a last resort. In regard to questions affecting employés in common, arrangements are to be made for the election of representatives, to whom interviews will be accorded. On the whole, while the decision of the authorities cannot be giving much satisfaction, there has not been a great deal of grumbling, possibly because the attitude of the Admiralty had been discounted. There is plenty of work in hand, and good progress is being made with the building and repair jobs. Portsmouth has in many ways felt the growth of Portland, Harwich and Cromarty as naval stations. Anything, therefore, which tends to bring back business is welcomed, even such a small matter as the reopening of the college for sub-lieutenants. This departure, however, will hardly compensate for the removal of the war school to Greenwich, which is also in contemplation.

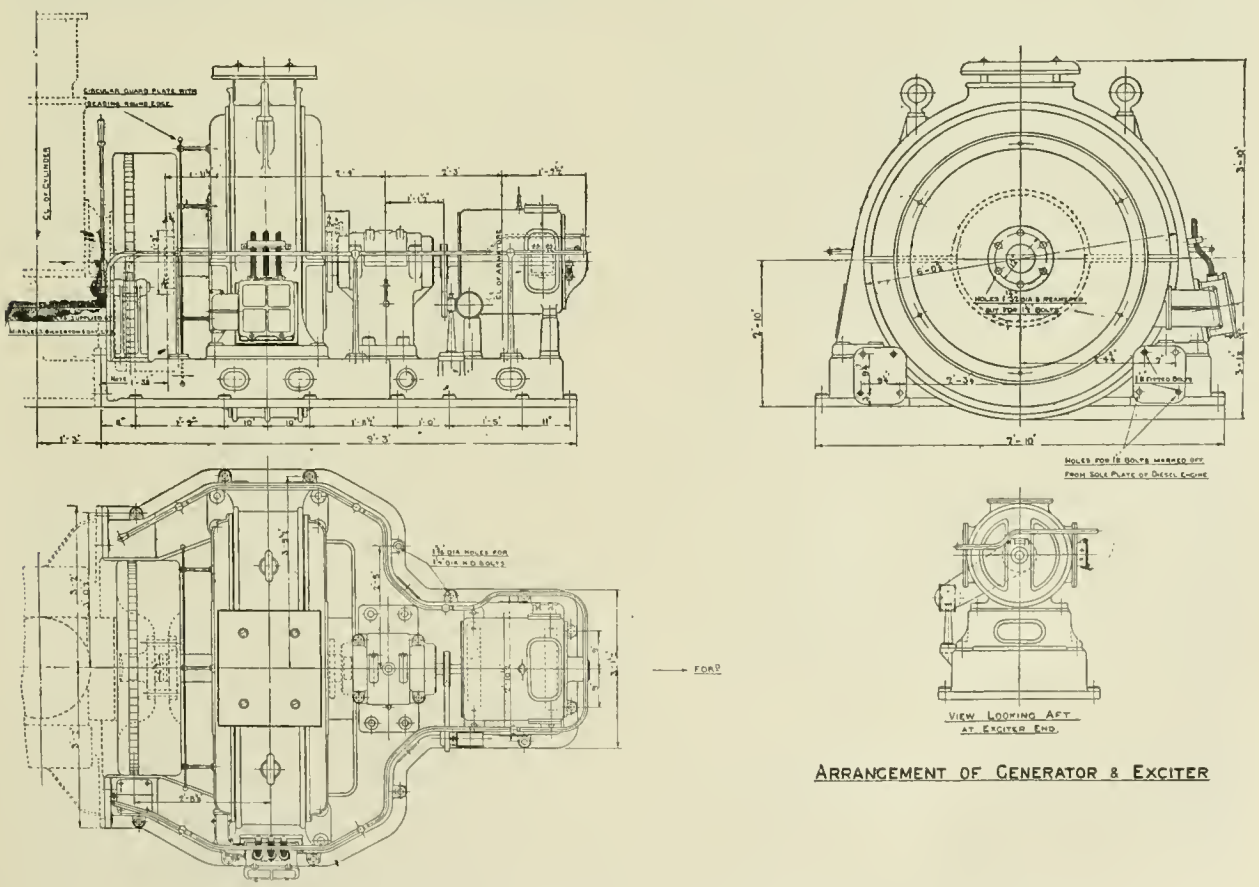
Devonport Dockyard.

The launch of the *Aurora*, light cruiser, on October 30th, was a complete success. The first keel-plate of the cruiser was laid on October 24th, 1912, by Mrs. Winston Churchill, and the naming ceremony was performed by Mrs. Lambert, the wife of another of the Admiralty Lords. Owing to various causes of delay, the ship has been on the slips a little over eleven months. She is the first of a new class to take the water, and has been called by Mr. Churchill a "destroyer of destroyers." Like the *Queen Elizabeth*, just launched at Portsmouth, she is to be entirely oil-fired, and a greater speed will be obtained on a displacement less than that of the "Bristol" type. The *Aurora* will be succeeded on the stocks by another light cruiser of similar type, the *Cleopatra*, but no date has yet been assigned for laying her down. As, however, the arrival of material is expected shortly, it should not be long delayed. The *Warspite*, battleship, is to be launched on November 26th, and her place will be taken by the *Royal Oak*, one of the battleships of this year's programme. Mrs. Austen Chamberlain has consented to name the *Warspite*, so the hope of a royal launch has been dissipated. However, as it is to take place on a Wednesday, which is early closing day in the Three Towns, bumper crowds are expected. A question which seems so simple that it is curious it should have caused so much heat has been raised by the action of a dockyard workman, who, against the regulations of the ship, entered the *Bellerophon* by the officers' brow. A brow, of course, is a temporary sloping platform placed between the ship and the shore to facilitate entry and exit. From the *Bellerophon*, which is here undergoing extensive refit, there were three brows, and the use of one of these was restricted to privileged visitors and officers. Whether the action of the man was taken to test the case is not clear, but it was not the first time that workmen had used this privileged brow, and that in spite of the objections raised by the sentry and quarter-masters at the gangway. When, however, this man repeated the offence, as it was regarded by the officers of the ship, his name and number were taken, and a sergeant of marines was told to keep him under observation until the matter could be reported to one of the inspectors in the dockyard. Thereupon the workmen held a meeting and passed a resolution protesting against the "indignity and humiliation of being placed under an armed escort," and they asked for an enquiry into the matter. Apart, however, from the action of the workmen, the Com-

mander-in-Chief had already ordered an enquiry into the affair. The result will be awaited with interest, as it is clear that some authoritative decision is necessary with regard to the use of the brows set apart for special purposes. An occurrence which was quite reminiscent of old press-gang days was brought about by a search for the stragglers of the Fourth Cruiser Squadron, and the offer of a bounty to the local police of £1 for each man caught. The search was conducted with great alacrity and enthusiasm, and more than half the laggards were picked up and handed over to the *Berwick*, which had been detained for the purpose.

Chatham Dockyard.

The launch of the eleventh submarine built at Chatham took place on October 2nd, and was entirely successful. *E7*, as this boat is called, shows as great an advance upon the early boats ordered in 1901, and some of which have recently been sold out of the service, as does either the *Queen Elizabeth*, launched at Portsmouth, or the *Aurora*, launched at Devonport, upon the battleships and cruisers of twelve years ago. We have a similar light cruiser to the *Aurora* building here which will be floated out on October 25th, after being nearly a year in hand. The ceremony of naming this ship, which will be called the *Arethusa*, is to be performed by Mrs. Macnamara, the wife of the Parliamentary Secretary of the Admiralty. Her keel-plate was laid on October 28th, 1912, and the delay, such as it has been, cannot be said to be due to the dockyard, but to non-delivery of material to date and similar causes. Two other cruisers will be laid down, as stated last month, and their names are to be the *Comus* and the *Conquest*. Plans have already been received for them, and the material is expected shortly. The replies to petitions, which have been about a twelvemonth due, have now been received. There are few concessions, but this was not unexpected, as most matters of importance had been settled in the meantime. The Board cannot agree to the plan of setting up conciliation boards by a system of conferences in place of the petition system. It is satisfactory, however, to know that an increase is to be made in the established lists, and steps are to be taken at once to extend the establishment system to the works department. Endeavours are also to be made to find permanent employment for men who are injured in the service, though such injury is not to be admitted as conferring a claim for transfer to the established list. Some regret has been expressed because the Admiralty are not prepared to institute any scheme for providing State-aided pensions for hired employés. There can be no doubt that the increase of establishment is a satisfactory feature. A larger proportion of men qualifying for pension makes for a cessation of labour troubles. It is hoped the time may come when all men of good character and ability will be established. Among other matters in the official statement which have given satisfaction is the concession to men employed for specially dirty and laborious work. They are to be allowed overalls, and if working under disagreeable conditions in confined spaces to have 1½d. an hour extra pay. In this connection, what might have been a very serious mishap occurred at the end of last month. Some men, when varnishing tanks in submarine *E7*, were nearly suffocated. They had capsized a tin of the composition, and the fumes given off in the enclosed space affected the men. Fortunately, they were missed by their companions at dinner-time, and were released, but they had a narrow escape. The *Cressy's* refitting has been completed, and she went down to Sheerness on October 14th. The *London* has arrived for refit, and she and the *Dominion* are in hand. The *King Edward VII.* and *Vengeance* have been completed, and the *Amazon* and *Viking*, after dry-docking, left on October 16th for Portland. The *Weymouth* arrived to pay off on the 15th and recommission, and has since left for Sheerness.



ARRANGEMENT OF GENERATOR & EXCITER

Arrangement of Generator and Exciter, *Tynemount*. Port Set (6-pole). Starboard Set (8-pole).

Sheerness Dockyard.

The battleship *Vengeance* has returned here after refitting at Chatham, and has resumed duty as sea-going instructional gunnery ship. Otherwise, we began the month with an almost deserted harbour. Several vessels passed through after finishing refitting at Chatham, including the *King Edward VII.*, but the two *Lord Nelsons*, the *Shannon* (flagship of Rear-Admiral Sturdee), *Dominion* and *Natal* have all left since last month. The *Hermes* has returned after her cruise of inspection and exercise as far as Scapa. She visited Yarmouth, Grimsby, Scarborough, Blyth, Rosyth, the Tay and Peterhead, as well as Cromarty, at all of which places there are air stations, or are to be soon. She has also been to Harwich, and since then has cruised off the Isle of Thanet for gun practice. She is now the official headquarters of the Naval Wing of the Royal Flying Corps. In this connection may be mentioned a visit made here by the airship *Delta* on an eight-hours' non-stop trial. It was on October 10th, and three naval aeroplanes flew up to meet her. She circled over the school at Eastchurch, the station on the Isle of Grain, and the new airship shed which is in course of erection at Hoo, and then returned towards Farnborough, following apparently the line of the Thames. Of course, great interest has attached to the issue of the official statement of the decisions of their lordships on the petitions received from the civilian employés in the dockyards and naval establishments in 1912. Although the Board will not agree to set up any other system in place of that now in vogue, several concessions are made with a view of facilitating the settlement of grievances. The established list is to be extended, and in selecting workmen for transfer from the hired to the established lists, preference is to be given to ex-dockyard apprentices and to others who have been trained as boys in the dockyards, so far as such preference is consistent with the object of ensuring that the workmen placed on the establishment are those with the best qualifications and character. The smiths' apprentices in their last year of apprenticeship are to have their wages increased by one shilling a week, to take effect from October 1st. But some disappointment is felt because, as regards hired service before establishment being reckoned in full for pension purposes, the Admiralty are not able to hold out any hope of a further concession to dockyard employés in this connection. The *President* (ex *Gannet*) has been brought here in order that some preparation may be made in her before she is taken to the Hamble River, she having been lent for instructional purposes to Mr. C. B. Fry. As she was housed in at this yard before she was sent to the London Docks, she should be found very suitable for the purpose. The *Leda*, which has been refitted here, is to be commissioned before the end of the month for service under the Admiral Commanding Coastguard and Reserves, relieving the destroyer *Wear*, which has been temporarily carrying out her duties. Good progress has been made with the repair of the destroyer *Earnest*, which was damaged by collision with another destroyer.

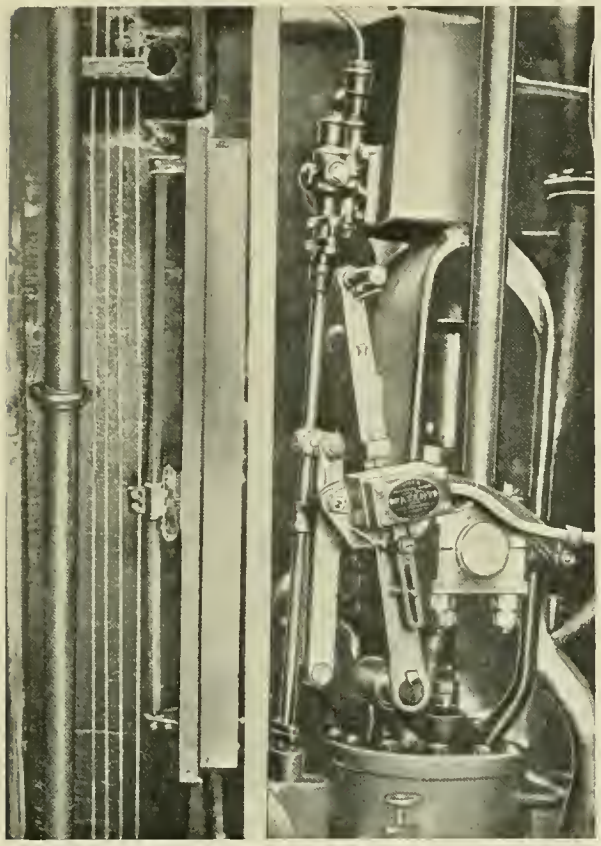
Pembroke Dockyard.

The annual inspection of the yard by the Commander-in-Chief at Plymouth took place at the end of last month. Sir George Egerton visited every part of the establishment, having a look at the various ships in hand, and also went to Milford to inspect the vessels in the Haven. The new cruiser, which has received the name of *Cordelia*, is being pushed on, many more hands being employed upon her. Her frame is now up so far that it is possible to see the differences between her and the vessels of the classes which have before been built at this yard. With all the ships, indeed, which we have in hand at the present time, very satisfactory progress is being made. Some question has arisen with regard to the refits of destroyers, and a comparison has been drawn between the time taken in this work at Pembroke and that at Sheerness. In any such comparison, however, it is necessary to take into account the existing facilities in the way of workshops and so on in the respective yards, and unfortunately Pembroke is not so well situated in this respect as Sheerness, for instance. The refit of the destroyer *Dove* has been completed, and her trials after retubing were satisfactory. The *Leopard* takes her place, and the *Thorn* is still in hand. When the new slipways are completed, they will assist towards progress in this connection. Some alteration is being made in the sheds here. The walls and roof over No. 6 slip have been taken down, but whether the same will be done with No. 5 is uncertain. In any case, this cannot happen until the *Trefoil*, oil-carrier, has been launched. Considerable satisfaction was felt at this yard by an official order for the entry of more apprentices. They are to be selected in order of merit from the last examination list, and to be taken on at the discretion of the Chief Constructor. It is believed that this decision has been arrived at in consequence of the increasing difficulty of obtaining shipwright mechanics. While it has been received with satisfaction in the town, the trades unions do not appear to regard it favourably. As at the other yards, the replies of their Lordships to the petitions have been received with mixed feelings. It was not expected that many concessions would be made in the way of improved rates of pay, but several classes have been affected. The boilermakers are to receive extra pay in certain circumstances. The scale of normal rates for smiths has been extended. Local officers may grant to painters employed upon important work an addition to their pay, while in a minor degree the hammermen, cranemen and fitters have also received concessions. The decision to increase the establishment is naturally received with satisfaction, but not entirely so the new arrangements to be adopted with regard to representations respecting conditions of employment. The *Terrible* has now arrived to join the fleet in the Haven, and telephonic communication has been established between the yard and the flagship, which should serve a useful purpose. Our new cruiser is to be called the *Carysfort*.

HILL'S ELECTRICAL ALARM FOR MARINE ENGINES AND TURBINES.

THE connection between the seat of navigation and that of propulsion in steamships—the captain's bridge on high, and the engineer's platform in the bowels of the vessel—has ever been, essentially, a close one, but now-a-days, with every resource of science brought into exercise, the connection almost amounts to material unification. Telegraphs—mechanical and electrical indicators as to direction of motion and revolution, speaking-tubes, etc., so knit the two stations together that everything, short of visual openness, has been effected to have promptitude, certitude and uniformity obtaining between them. Electricity has contributed to this in a marked degree, and it is the object of this article to call attention to a further direction in which it is unifying the two stations.

It is common enough knowledge that an engineer may sometimes be apt to operate his engines contrary to the direction called for by the telegraph from the bridge. Many instances, indeed, can be cited where through such mistakes, serious damage to vessels has resulted. To prevent such occurrences, various devices have been patented and put upon the market from time to time, but for one reason or another these have failed to take a permanent place in the outfit of bridge and engine-room communication. The Hill Patent Alarm, about to be described, embodies features which constitute it worthy of the best attention of marine engineers generally, as fulfilling in a most thorough manner every requirement of the case. It is an indicator which gives *anticipatory indication* of a wrong movement of the main or reversing engines, and is the product of practical experience (the invention of a marine superintendent of a well-known Glasgow line of steamers). It is an apparatus beyond the experimental stage, for it has already been fitted, and answered every function claimed for it, on board seven or eight vessels. Its success in principle is equalled by its satisfactoriness in respect of manufacture. In design, and in general arrangement of parts,



A — Bridge Telegraph Switch let into telegraph casing.

B — Control Switch fitted to control lever quadrant of reversing engine.

Hill's Electrical Alarm, as fitted to the ss. *Afton*.

everything has been proportioned and relatively adjusted by careful observation in actual service.

The Hill Alarm is particularly conducive to quick handling of the engines in reply to orders from the bridge, and, as above indicated, its anticipatory character is one of its unique and most important features. It indicates, in short, a wrong movement *before* the reversing engine *starts* to move. These are not contradictory terms, for with the telegraph and control lever in their respective "stop" positions, should an order be given to move the engine "ahead" or "astern," immediately the engineer attempts to move the control lever, and before the reversing engine *moves*, an indication, sharp and arresting, is given when the attempted movement of the control lever is a *wrong* one.

Primarily, the Hill Alarm (having a battery, bell, and necessary wiring) consists of two switches, one operated by the bridge telegraph, and the other by the control lever of the reversing engine, all in the engine-room. A corresponding bell can be fitted on the bridge, if desired. The arrangement is such that, if the bridge telegraph is in any of the three positions: "ahead," "stop," or "astern," and the control lever is not in agreement with these, the bell rings continuously until the engineer puts his lever in agreement with the bridge telegraph. There is, however, a very important exception to this arrangement, in the case of certain positions of the telegraph, necessitated by working convenience. If the bridge telegraph is in either of the two positions: "finished with engines" or "stand by," the bell will not ring, no matter what position the control lever may be in. As soon, however, as the bridge telegraph is moved to any other order, the bell will ring if the control lever is not in the corresponding position. These two *silent points* have been introduced to enable the engineer to warm up and manœuvre the engines.

Only a brief description of the fitments and connections comprising an installation of the Hill Alarm need here be given. The control switch, which can very conveniently be fixed to the control lever quadrant of the reversing engine, by which it is operated, comprises a strong cast-brass box (see "B" in accompanying illustration), containing the necessary contact plates embedded in, and thoroughly insulated by insulating blocks, with a pivot for carrying the switch lever. The steel operating pin works in a slot in the above lever, and is tapped into the control lever at the most suitable point for giving the correct travel to the switch lever. The four terminals, which are provided with sweating lugs, come out on the front of the box, and are protected with a cast-brass cover. The telegraph contact, or switch, is by preference let into the telegraph casing (see "A" in accompanying illustration), and is carried on a teak base, on which are mounted the necessary brass contacts and insulating strips. Contact is made by phospher bronze springs fixed to a moving block, which, in turn, is clamped to one of the wires from the bridge telegraph, and which slides along a diamond-section guide-bar. This arrangement does not interfere with the usual telegraph wire leads, nor the tightening or adjusting of same. The terminals are on the back side of the aforementioned base, four being at one end and two at the other, and are protected by a strong, removable teak cover. The electric bell is provided with a cast-metal case and weather-proof hood, the diameter of the gong being 4 in. or 6 in. The bell is mounted on a teak block, provided with a recess to protect the terminals. As an alternative to the bell, a gong bell or a buzzer can be supplied. The battery consists of three agglomerate type Leclanché sealed cells, in suitable box. The necessary cabling, clips, etc., are of efficient and lasting description. The whole of the installation is designed, as far as possible, to avoid giving any trouble. Once installed, the battery is the only item requiring any attention, charging being necessary, on an average, every eighteen months.

Prices and further particulars of this apparatus, which, without doubt, has strong claims on the attention of shipowners and superintendents, especially those whose vessels have to traverse busy routes and crowded waterways, will gladly be furnished by the sole makers, Messrs. Telford, Grier & Mackay, Ltd., 16, Carrick Street, Glasgow. In this firm's shops, also, a full-size working alarm can be seen.

Mr. Charles H. Luke, joint manager of the Shipping, Engineering and Machinery Exhibition, to be held September-October, 1914, advises us that he has severed his connection with the "Engineering Review," and henceforth will devote himself entirely to trade and other exhibition work. At the present time he is connected with schemes in London, Paris, Glasgow, Manchester, Sheffield, etc.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The British India Steam Navigation Company
is reported to have made another absorption. This time the acquisition is the Eastern Shipping Company, whose headquarters are at Penang. It has a fleet of some eighteen vessels, of which the smallest is the *Deli*, of 113 tons gross register, built in 1889. The biggest is the *Tong Hong*, built in 1891, of over 2,100 tons, once flying a well-known Liverpool house flag; whilst the next in size is the *Rotorua* of just under a thousand tons gross.

A Successful Expedition
through the Kara Sea to Siberia was made by the Norwegian steamship *Correct* in the months of August and September. Passing through the Kara Straits on the 10th August she arrived safely off the Yenisei river on the 28th of the same month and at once began the discharge of her 1,500 tons of general cargo into river steamers. By the 10th September the discharge and reloading of the ship with a similar weight of cargo—consisting of Siberian produce brought some 2,000 miles from the interior—was completed and the vessel started on her return voyage, which was effected without any mishap. The *Correct* arrived at Tromso on the 20th September and subsequently proceeded to Hull. This achievement has been the result of much thought and a good deal of expenditure by Mr. Jonas Lied. It is probable that in future years the trade may be greatly developed and with a view towards facilitating this the Russian Government is about to erect several wireless stations for the purpose of affording information as to the movements of ice. Three of these stations were already in operation when the *Correct* made her voyage.

Great excitement and even indignation
was excited in the breast of Senator Clark—a prominent American—who went down to Queenstown in the last days of September to embark on the *Olympic* for New York, when he and his fellow intending passengers saw the liner making for the westward without them, but eventually it was seen that it was impossible to transfer the passengers from the tender outside the harbour, whilst the weather conditions did not permit the big ship to enter between the heads. Anyhow the eight guests of the owners who had embarked at Southamption for Queenstown took their involuntary journey across the Atlantic with more philosophy, and the White Star people have since made the announcement that the *Olympic* will not in future embark or land passengers at Queenstown. Special cases of alleged inconvenience cannot thus again occur.

The "Imperator."
The rumours which have for some time been current as to the large alterations which are to be undertaken during the off-season, on the Hamburg-American Co.'s giant *Imperator*, have now crystallized into a definite pronouncement of Herr Ballin to the effect that a thorough reconstruction of her boilers is contemplated. It seems by no means improbable that a large part of the work will be accomplished in the new Gladstone Dock at Liverpool, in spite of somewhat ridiculous ideas as to the impropriety of allowing a German vessel to take advantage of—and incidentally pay for—the privilege of being docked there. It is also said that alterations are to be effected in the vessel's reversing turbine. Anyhow, there is a question as to the parties upon whom this necessarily heavy expense is to fall. Herr Ballin asserts that the cost must fall on the builders, in consequence of a five years' guarantee of the engines, and one London journal goes so far as to add that the contract provides for the payment to the owners of interest at the rate of 6½ per cent. per annum on the cost of the vessel during the time she is away from her work. Anyhow the builders do not quite accept these views and the position for the moment between the parties is strained. The accuracy of this statement attributed to Herr Ballin, as quoted above, has since been impugned, and it is said that the cost of what is to be done will not exceed £20,000 or take more than six weeks to execute. So the whole matter is still obscure. The "Times" gives one piece of information in this connection which goes far to explain why the big Atlantic companies have taken so kindly to the idea of 50,000-ton liners. On her most recent voyage to New York the *Imperator* carried 4,600 persons, all told. Of these 859 were in the saloon, 2,109 were third-class and 633 were intermediate passengers. It is added that the passage money exceeded the sum of £65,000. This for a single voyage! It is hardly needful to add that the amount is a record.

The White Star Line
have done well with their big Australian liner, the *Ceramic*—which is said to be the biggest vessel ever seen south of the Equator. She averaged over 15 knots the whole way to Australia, and at times touched a speed of 17¾ knots. Her good average was made in spite of bad weather and generally she seems on her maiden trip to have given complete satisfaction to all concerned. Besides her speed and size she has another distinctive record. She has been fitted with two 4·7-inch guns under Mr. Churchill's scheme, and these were on her trial trip actually fired. She was therefore the first of the new armed merchantmen to make a real test of her armament.

THE "VOLTURNO."

THE forces of Nature have not been long in showing that the circumstances attending the loss of the White Star liner *Titanic* were altogether exceptional, and that the provision of "boats for all" would not succeed in removing all the terrors of the sea. The case of the *Volturno* comes in strong contrast to that of the bigger vessel. The loss of the *Titanic* was due to the fact that the sea was so calm that no ripple showed on the base of the fatal iceberg. The loss of life was due to the fact that there were not enough boats available to carry all the complement of the ship, whilst, even if the ship herself had had them, the time passing between the fatal wound and the sinking of the ship would not have allowed them all to have been put in the water. In the *Volturno* case we have ample time between the discovery of the fact that the ship is doomed and her becoming impossible as a refuge, and we have not only enough boats on her to carry every one, but a surrounding fleet which might have put out ten times the number of boats needed to deal with the situation. The master of the *Volturno* did not, and could not, know how long his ship would last, nor how the conditions of weather would be even a few hours ahead, and he was therefore no doubt amply justified in letting the boats be launched. But though that be so, it is clear, when we look back at the two cases, that the lives lost in the *Volturno* would not have been thrown away if the people had stuck to the ship, whilst those who were lost in the *Titanic* were sacrificed to inadequate boat accommodation. Thus we are assuredly justified in saying that the lamentable catastrophe which has just occurred is proof, if proof he needed, that it is impossible to provide for absolute safety in the case of every possible eventuality at sea. The story of the *Volturno* may be briefly summarized. The vessel was a steel twin-screw liner of 3,581 tons gross register, built in 1906 by the Fairfield Shipbuilding Co. She was fortunately fitted with wireless, and seems to have been built with that strength and care for which the yard from which she came has so long been famous. Her owners were the Canadian Northern Steamship Ltd., but she was under charter to the Uranium Steamship Co. She left Antwerp on her fatal voyage on the 2nd October and carried, besides a general cargo, 564 passengers, of whom twenty-four were in the cabin, and 540 in the steerage. Her crew of ninety-three persons was under the command of Captain Frank Inch. For a week the voyage was apparently uneventful. But when the vessel was in lat. 49·12 N. long. 34·51 W. a fire was reported in the fire hold. This was at 6.50 a.m. on Thursday, the 9th October. Measures were, of course, taken to combat it, but it spread rapidly, as may be gauged by the fact that the forecastle was so soon alight that three of the crew were imprisoned and burnt to death before the ship could be put before the wind to enable the ship's three fire hoses to be got to work. Meanwhile the wireless operator was sending off the S.O.S. signal which fortunately reached the Cunarder *Carmania* almost at once. That vessel was some 78 miles off, but Captain Barr promised Captain Inch that he would be up in four hours and, in spite of a very heavy head sea, the *Carmania*, by the devotion of

her crew, fulfilled the promise made for her, getting her speed up it is said to 20·9 knots—a speed under the weather conditions prevailing which seems almost incredible. When the *Carmania* came up, a steam tanker, the *New-York*, of Rotterdam, was alongside, but she was not able to do much and was not fitted with wireless. Under the howling gale which was blowing it was then impossible to lower boats, as the master of the *Volturno* had found by disastrous experience, one boat after another having been lowered and destroyed with its hapless occupants. Two of the boats were indeed believed to have got away, and, by the request of the *Volturno*, the *Carmania* went away to look for them—the *Seydlitz* of the Nord Deutscher Lloyd, which had now come up in response to the wireless signals, standing close in during the Cunarder's absence. By this time the Cunard captain had made two attempts at rescue. The first was the sending away, under chief officer Gardner, of a boat which was powerless in the then prevailing seas and which only by the best management and good fortune saved its own occupants. The second was a desperate attempt to manœuvre the ship into such a position that she could throw a line on to the deck of the burning ship already rolling helplessly in the trough of the mountainous sea. The *Carmania* soon returned from her fruitless search for the boats and by three o'clock was making another attempt to communicate by sending down life rafts to the *Volturno*. The International Co.'s twin-screw liner *Kroonland* was now on the scene and four attempts to get a boat to the burning ship were made unsuccessfully. Then up came the *Minneapolis* of the Atlantic Transport Co. She put down a boat which, by extraordinary perseverance got three times under the stern of the *Volturno*, and begged the cowering passengers to jump and be picked up. But they had seen so many of those who left the ship swept away, that they, perhaps, not unnaturally refused to stir and the boat after four hours' exposure to the sea got alongside the *Carmania*, which just managed to rescue its exhausted crew. So things went on till six o'clock, when the *Carmania* brought into action her searchlight, and by its operations greatly facilitated the work of rescue. The suggestion that mail steamships should in future carry these appliances seems to have been the chief benefit of the costly enquiry into the loss of the *Titanic*, and even then it will be remembered many people protested that the proposal would be a dangerous one. At the same time the weather changed somewhat. The heavy rain turned to a drizzle and the sea became gradually less furious. At about 8.30 p.m. the flames, hitherto confined to the fore part of the vessel, attacked the bridge, and shortly afterwards there was a series of explosions, which not only further terrified the unhappy survivors, but also gave the attendant vessels warning that the time for rescue was indeed limited. At 10 p.m. the Leyland liner *Devonian*, which soon did excellent boat service, arrived. At 10.30 p.m. the French mail steamer *La Touraine* came up and at midnight the Russian liner *Czar*. By 1 a.m. the sea warranted the Russian in sending away her boats to attempt the rescue of passengers, and they got their first salvage of fifteen lives aboard their steamer by 1.30 a.m. Altogether this ship's boats made four trips, and on one they brought away no less than fifty-six women and children. At 7.40 a.m. on the Friday morning the Anglo-American Oil Co.'s tank steamer *Narragansett* came on the scene steaming for all she was worth, and, taking up her station to windward, at once began pumping two streams of lubricating oil on to the waves. This had a marvellous effect in smoothing out the breaking seas and enabled the boat service from the various steamers to be accomplished with increased rapidity and less risk. It should be mentioned that the Leyland line had another vessel, the *Asian*, also on the scene, though like the *New-York*, she did not have the privilege of saving life.

Our narrative is necessarily a little confused from the fact that, so far as we are aware, the times at which the Nord Deutscher Lloyd liner *Grosser Kurfurst* and the Furness-Withy liner *Rappahannock* came up have not appeared in print, but they were amongst the group of salvors early on the Friday morning and were at work saving life by boat service long before daylight. The numbers saved by each ship were as follows:—*Grosser Kurfurst* 105; *Czar*, 102; *Kroonland* 90; *Devonian*, 59; *La Touraine*, 40; *Seydlitz*, 36; *Minneapolis*, 30; *Narragansett*, 29; *Rappahannock*, 19; *Carmania* 1; total, 521. The *Carmania's* one was a foreign steerage passenger who jumped from the doomed ship into the sea and swam, crying for help, to the liner. His cry was not in vain, for, finding that he was unable to muster strength to catch a rope, able seaman Heighway leapt into the boiling sea and put a line round him whereby he was dragged into safety. The *Carmania* too saved the crew of the *Minneapolis's* boat, besides organizing the rescue and searching for the missing boats of the *Volturno*. A little after eight o'clock on the Friday morning, twenty-five hours after the outbreak, Captain Inch came down from the *Volturno*, having satisfied himself that no living soul remained on board. He brought with him the ship's papers and was accompanied by the wireless operator. These went aboard the *Kroonland*. The *Grosser Kurfurst* took to New York, besides those rescued by her boats, some thirty-two persons who were picked up from the sea, a number who were saved by the German liner's own boats, and Mr. Lloyd, second officer of the *Volturno*, who with three others successfully pulled one of the doomed ship's boats to the *Kurfurst*, against whose sides she was promptly smashed. Mr. Lloyd is reported to have found great fault with the life salvors for that they did not commence the boat service earlier. But when we remember that it is said that a considerable number of the *Volturno's* people were killed by fire and explosion; that three of her boats were smashed in lowering, when empty; that a considerable number of people were lost by the smashing of another boat containing a considerable number of passengers, and that two are believed to have been driven away and lost—it will be seen that the masters of the surrounding steamers were as wise as they were brave. They had the desire to save life undoubtedly and they showed it. But they also had stern duties to their own people and had no right to throw away those people's lives recklessly. That over 520 people were safely taken from the burning ship under such circumstances and that none of the rescuers were lost is a sufficient proof of the skill, judgment and determination of the International fleet of rescuers. A Board of Trade enquiry is to be held, presumably in London, and no doubt further details will then be forthcoming.

MARINE MOTOR NOTES.

THE fire which resulted at Brooklands during the aeroplane race—due to a collision between two motor cars—when a petrol tank was crushed and the petrol allowed to escape, may serve as another warning to those in charge of explosive engines. Another case of fire occurred, where a cask of petrol was delivered as paraffin to the warehouse of a retail trader. The assistant unwittingly was less careful in serving out the contents of the cask, and when using a candle in filling a measure of the spirit, a flame was kindled, which brought about the fire and considerable damage was done to property.

The report of the Geological survey of Skye, with special reference to the shale found on the island, shows that the samples tested in the laboratory give evidence of possible prospects of the development of a working arrangement. The rumour of a new oil field in Canada has been published, and in the present state of the market every fresh discovery in this direction is an advantage. The continuation of the unhappy state of Mexico is detrimental to the oil industry, as it is to other interests, and it might be an advantage if some of those who are so eager to set things right would turn their attention to South America and try their hand in Mexico, thus conferring one at least undoubted benefit on their generation, with the possibility of another to follow. In the references which have been made to the education and training of engineers with a view to Board of Trade certificates, no special comment has been given on the knowledge and training required for engineers to take responsible charge of internal combustion engines, although stated in the regulations; this subject, however, has not been overlooked in the new engineering laboratory opened recently at Dundee in connection with the University College, as a gas engine and producer of about 30 h.p. have been presented by the National Gas Engine Co.; it is intended to have a Diesel engine installed also—in addition to the steam engine and boiler and other appliances for testing results and economies, as well as the usual machines for tests of materials.

The Scottish Motor Coasting Co.'s new vessel, the *Innistrahull*, fitted with Beardmore's engines of about 240 b.h.p., gave satisfactory results during her trials and is about ready for work. The space and weight saved in a vessel with internal combustion engines, compared with one fitted with steam, is a subject frequently discussed, with a view to the deduction off the gross tonnage of the Board of Trade percentage allowance for engine space, being reconsidered and made more favourable to oil motor vessels; as a result of this being discussed at Newcastle it was pointed out that the ballast tanks are sometimes utilized for the carriage of oil fuel, and this fact might militate detrimentally in respect to deductions, and it was decided to leave well alone. The Asiatic Co.'s oil motor vessels continue their voyaging with satisfactory results, the *Jutlandia* was in the Thames during last month and showed to advantage in respect to her condition.

The oil-tank motor vessel *Wotan*, of about 5,700 tons, fitted with two-stroke cycle motor, which is now on her first voyage, is an interesting addition to the oil carriers, judging from the illustrations received, showing the machinery and portions of the ship. The present price of oil will militate against her in running costs, compared with steam-driven oil tank vessels, but there are compensating advantages and economies which will probably show to the credit of the oil motor over the steam in the results of a series of voyages. The new motor barges, formerly referred to as coming to serve on the Thames, are beginning to fulfil their promise, and we may look to see them multiply with advantage to the shipping interests of the rivers and docks. The auxiliary motor ship *France* has recently been got ready for service and expectation runs high as to the results; she is much larger than any former venture of a sailing ship so fitted. Messrs. Thorneycroft have recently built and fitted with oil motors two interesting vessels. One was a serviceable launch about 50 ft. long for China, to run on the rivers for commercial purposes. After running trials to prove her paces the boat was disconnected for shipment, to be refitted on arrival at her port of destination; the other was fully 60 ft. long, and fitted for the accommodation of about fifty to sixty passengers and the carriage of mails between Africa and Europe in connection with the Algeciras Railway. Both vessels are fitted with twin screws and their speeds are 9 and 11 knots respectively. This firm has built and engined a number of launches similar to these, and they are well illustrated in their catalogue. The large cargo vessels now propelled by oil motors are specially noted in the reports of the various classification societies, the more recent are the *California*, of about 4,200 tons, and the *Pedro Christophersen*, of about 3,725 tons, by Messrs. Burmeister & Wain, Copenhagen.

The new Trinity pilot cutter *Totland*, built by Messrs. Dible & Co., Southampton, and fitted with an 80 b.h.p. Beardmore engine, was tried (in Southampton Water) on October 13th, when a speed of fully 8 knots per hour was readily attained. This vessel will be followed by a similar one, to be named the *Calshot*, under construction by the same builders.

FOREIGN NOTES.

Austria.

THE cargo steamer *Nimrod*, of 9,400 tons, built to the order of the Austrian Shipping Co., Gerolornich and Co., has just been launched at the Trieste shipyard. The *Nimrod* is 137·56 m. long and has a beam of 16.46 m. Her engine, of 2,800 i.h.p., will give the vessel a speed of 10½ knots. She has been constructed in an exceptionally short time as the keel of the vessel was laid on the 1st April of this year and during the present month she will start on her first voyage out.

Canada.

It is intended to acquire an ice breaker to keep an open passage in winter between Montreal and Quebec on the Lawrence river. The dimensions of the ice breaker are to be as follows:—Length, 275 ft.; beam, 57 ft.; depth, 32 ft.; draught, 20 ft. The engines are to develop 9,000 i.h.p. The construction of this powerful steamer will be accelerated as much as possible and the plans are to be ready very shortly.

Denmark.

The *California*, a twin-screw motor oil steamer of 8,000 tons carrying capacity, built to the order of the United Steamship Co., at Copenhagen, has recently been launched at the Burmeister & Wain shipyard. Her length is 123·4 m., beam 16·4, and two Diesel motors totalling 2,600 i.h.p. will give her a speed of 11 knots.

France.

The mail steamer *Ville de Bastia*, of the Fraissinet Co., has been sold to the Compagnie Maritime Italienne, the latter Company having been engaged by the Italian Government to carry mails. The Company has already bought the mail steamer *Oasis* from the Touche shipping firm for the same purpose.

The State Railway have sold their mail steamer *Caen* of 530 tons to an Italian shipping firm. She was built at Havre in 1890 as a twin propeller steamer for the transport of passengers and general cargo. The *Caen* has a powerful engine of 1,600 i.h.p., which gives her a speed of 16 knots. The new steamer *Ango*, built at the Chantiers de la Méditérranée to the order of the Chargeurs Réunis Co., has just terminated her trial runs very successfully, and has started on her first voyage to Brazil and La Plata. Her length is 126·5 m., beam 16·4 m., and on a draught of 8·0 m. she has a carrying capacity of 8,650 tons. She is equipped with one engine of 4,000 i.h.p., which drives one propeller. The *Ango* is also fitted with all modern comforts for passengers.

The Ateliers et Chantiers de France have just received an order from the Chargeurs Réunis Co. for two cargo and passenger steamers for the Brazil-La Plata line. Their dimensions are to be—length 146·0 m., beam 17·7 m., draught of 8 m., with a carrying capacity of 8,800 tons. They will be equipped with passenger accommodation for 550 passengers. The same shipyard has an order for a large mail boat, the *Asie*, also in course of construction for the same Company.

The French Admiralty has just acquired the *Lucellum*, a large oil steamer, which has been given the name of *Garonne* on coming under the French flag. Her length is 120 m., beam 15·48 m.; on a draught of 8·40 she can carry 11,000 tons and her motive power of 2,750 i.h.p. gives her a speed of 10 knots, steam is supplied by two boilers which can be fired with coal or oil. The Authorities are negotiating for a similar oil steamer to be delivered in a short time.

The submarine *Gustave Zédé* has now completed her trial runs. This vessel was commenced in 1910 and is the largest of all existing submarines. Her length is 74 m., beam 6 m., and her displacement on the water is 800 tons, and under water 1,050 tons. The speed is 20 knots on the surface and 12 knots under water. It was originally intended to provide the *Gustave Zédé* with petrol motors, but finally steam power was decided upon. She is fitted with eight torpedo launching tubes and four quick-firing guns. A special feature of this submarine is the life-saving cabin for the crew in the front part of the boat for use in emergency, which can be detached so that it may rise to the surface. There are four further submarines of this type in course of construction.

Germany.

The new experimental establishment at Hamburg for testing models of ships will have a basin of over 330 metres length, and will be 8 metres broad by 6·5 m. deep in one part, and 16 m. broad by 7·5 m. deep in another part. The basin will have a capacity of 28,000 tons. Models of vessels up to 11 m. long, which will be driven by their own motors, can be tested up to a speed of 40 knots. The two parts are divided by lock gates so that they may be employed separately.

The Bremen Vulcan shipyard at Vegesack has received an order for two cargo steamers of 9,000 tons carrying capacity from the German East Africa Line. The vessels are to be provided with comfortable passenger accommodation and wireless plant, besides submarine signalling apparatus and electric lighting. Refrigerating compartments are also supplied to meet cargo and provision requirements in the tropics.

The North German Lloyd has decided to increase its fleet by the construction of four 12,000-ton cargo steamers, a 35,000-ton sister ship of the *Columbus* type, and a cargo steamer of 18,000 tons. Orders for two of the 12,000-ton steamers have been placed with the Howaldt Works at Kiel and one with the Bremen Vulcan, and the order for the 18,000-ton steamer has been placed with the Weser shipyard.

The cargo steamer *Andromeda*, of 4,400 tons carrying capacity, built to the order of the Steamship Company Argo at Bremen, has just been successfully launched at the Oder Works shipyard at Stettin. Her engine is of 1,700 i.h.p. and the vessel is fitted with an electric light installation, a wireless plant and a submarine signalling apparatus. The screw steamer *Tasmania*, of 12,000 tons, built to the order of the German Australian Steamship Co., at the Flensburg shipyard, has just been put through her trial runs, and these being satisfactory she was at once taken over by the Company. The *Tasmania* will at once enter on her service with cargo for Australia.

Holland.

The cargo and passenger steamer *Prinz der Niederlanden*, built to the order of a Dutch Shipping Co., at the shipyard of the Nederlandsche Scheepsbouw Maatschappij at Amsterdam, has just been launched successfully. Her length is 146·45 m., and she has a displacement of 13,450 tons. Two quadruple-expansion engines of together 5,350 i.h.p. will give her a speed of 15 knots. This steamer is to be fitted with all modern appliances ensuring the safety of the ship and passengers, including a wireless plant, submarine signalling apparatus and boats able to accommodate all on board.

Japan.

The orders for the three new battleships voted in the Budget 1913-14 have now been placed. One of them is to be built at the Government shipyard at Iokosuka and the two others at the private shipyards at Mitsu Bishi and Kawasaki, so that at the present time there are seven large battleships in course of construction at the home shipyards, which are all to be ready for service by the end of 1917. A number of destroyers and submarines are also included in the Budget referred to, as they are considered of special value for coastal service.

JAMES WATT ANNIVERSARY.—The "Watt Lecture" of the Greenock Philosophical Society's course in the coming session will, on this occasion, be delivered by S. J. P. Thearle, LL.D., London, chief ship surveyor to Lloyd's Register, his subjects being "The classification of mercantile shipping." The "James Watt" anniversary dinner, held under the auspices of the Institution of Engineers and Shipbuilders in Scotland, will take place on January 16th, in the banqueting hall of the Grosvenor Restaurant, Glasgow.

CAPTAIN JAS. SMITH.

THE retirement of Captain Jas. Smith from active sea service is noted as an event of interest to many of our readers to whom he is known and esteemed for his good qualities, and whose best wishes accompany him as he walks amid unwonted scenes and looks upon the land in place of on the sea. Born in the north of Scotland (Banff) in 1853, he was educated at Liverpool College, and went to sea in 1867. About five years later he joined the service of the British India S.N. Co., and, after serving on the Indian coast and passing through the various official experiences, was promoted to the command of a steamer in 1878. Subsequently he sailed in command of other steamers from London to India and from London to Queensland. During the last fifteen years he has been engaged in the Transport service sailing from Southampton, first in the *Dunera* and afterwards in the twin-screw steamer *Rohilla* (built by Messrs. Harland & Wolff in 1906). The number of troops carried in these steamers under the command of Captain Smith amounts to 100,000, and the ports to and from which they have been taken embrace nearly the whole area of the empire. His service qualified him to receive the Egyptian medal (1882) with the Khedival star, the South African transport medal and the Coronation medal. It is of great interest to note that Mr. M. Turnbull, present chief engineer *Rohilla*, has been shipmate with Captain Smith for twenty-five years, with mutual satisfaction, and during that period they have journeyed about 1,000,000 miles together. Captain Smith is a student and an author, having brought out two books for the help and edification of those who seek to study navigation. The titles of these works are *The Ex-Meridian Calculator* and *The Off-Shore Distance Calculator*.

Captain Jas. Smith.

NEW APPOINTMENTS.

TWO appointments of Glasgow metallurgical experts to important positions in the works of Internal Combustion Engine manufacturers have recently been made. Mr. John S. Glen Primrose, A.I.M.M., of the Royal Technical College, Glasgow, has been appointed to the position of research metallurgist and chemist in charge of the material testing department of the Consolidated Diesel Engine Manufacturers, Ltd., of London and Ipswich. Since graduating as an associate of the college in 1905 he has been connected with the metallurgy department as lecturer and chief assistant. In recent successful investigations into the practical heat treatment of Admiralty gun metal he was assisted by his brother, Mr. H. S. Primrose, who for some considerable time has been metallurgist to Messrs. G. & J. Weir, Cathcart, and has been appointed to a similar position in the firm of Carels Frères, Ghent, the builders of Diesel engines in Belgium.

Messrs. John Brown & Co., Clydebank, have appointed, as assistant manager of their shipyard, Mr. W. Cole, inspector of shipwrights in the Admiralty Dockyard Construction Department, at present employed on overseeing duty at Barrow-in-Furness.

Mr. A. S. McLellan, who for some little time has been connected with the engineering section of Messrs. Alex. Stephen & Sons, Ltd., Linthouse, has been made a director of the company. He is related to the Messrs. Stephen and also to the Messrs. P. and W. McLellan, the well-known steel merchants and bridge builders.

The new Works' Committee of the Clyde Trust have unanimously recommended that Mr. P. D. Donald, who has been leading assistant engineer for the past ten years, be promoted to the position of chief assistant in room of the late Mr. A. Hamilton.

CALTEN'S PATENT TELEGRAPHS AND INDICATORS.

THESE instruments are designed for the transmission of signals for such as steering or engine room telegraphs or for crane indicators. The indicator for the latter gives, for example, the height of the lift in feet and inches, and the advantage of such an indicator in foggy weather will be readily understood. The system of transmitting signals on board ship by means of wires, chains and spur wheels is quite efficient when there is no considerable distance between the two stations, but when these distances are increased, as they have been in the modern liner, electrical transmission is a system worthy of every consideration, as it combines accuracy with rapidity and silence.

It is interesting to note that the Calten's patent instruments may be placed in close proximity to the compass, as there is no magnetic leakage. They are also so designed that defective parts may be replaced in the shortest possible time without disturbing the working of the instrument.

Fig. 1. General appearance of Calten's instruments.

The new principle now embodied in the apparatus only applies to the motor of the receiver, inasmuch as the electro magnets of the motor are placed opposite each other, each opposite pair being magnetized at the same time. The movement of the armature is obtained by the rotation of the field, by means of the transmitter, through the various pairs of magnets, an intermediate position being obtained by magnetizing adjacent pairs. In this way the rotor is always steadied between two or four poles. A brake device, which is necessary for instruments with an interrupted current to counteract the inertia of the rotor, is, therefore, not required, and, for the same reason, there is no chance of the instruments getting out of step, even when rotated at a high speed. The rotor follows the rotating field in the magnet ring and the momentum of the rotor is so small in comparison with the magnetic field acting on it that it comes to rest immediately the rotation of the field stops.

Fig. 2. Combined steering telegraph and rudder tell-tale for bridge.

Fig. 1 gives a good idea of the general appearance of some of the apparatus. Fig. 2 represents the combined steering telegraph and rudder tell-tale for bridge, and shows the combined instrument with the cover removed, a back view of the watertight casing having the two motors, one for the steering telegraph and the

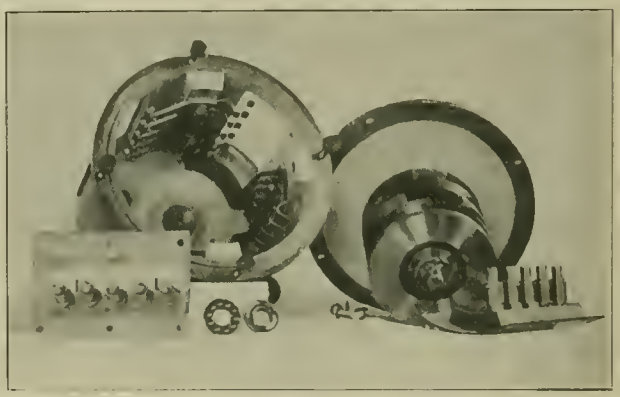


Fig. 3. The rudder transmitter.

other for the rudder tell-tale, and the transmitter for the steering telegraph, which is on the same principle as the rudder transmitter, but on a smaller scale. The spring contacts on the combined instrument are the connections for the transmitter of the steering tele-

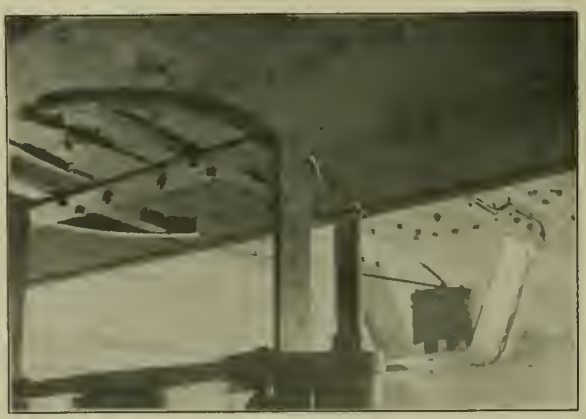


Fig. 4. Method of connecting transmitter to the rudder head.

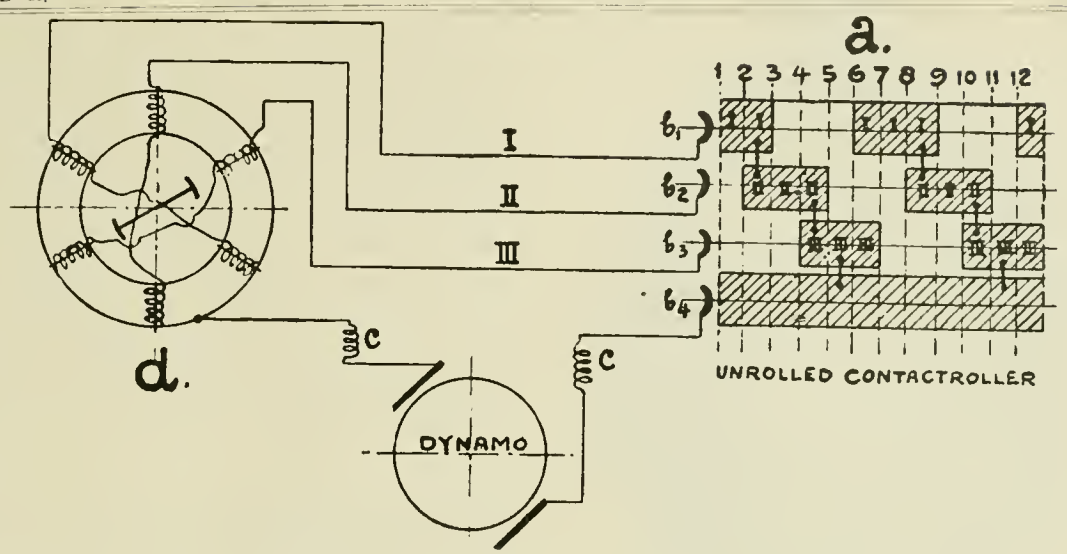


Fig. 5. Diagrammatic View showing general principle of Receiving Instruments.

graph, and, as will be seen, the connections are in the form of plugs, so the whole instrument can be dismantled without breaking any of the wiring connections. Fig. 3 represents the rudder transmitter, which constitutes the signalling instrument for the rudder tell-tale. The heavy revolving part is fitted with ball bearings. The contact springs, of which three sets are provided, are of silver. These springs effect the contact between the brushes and the revolving part, so that in this case also the instrument can be dismantled without disturbing the wiring. The brushes are fitted in triplicate to avoid any danger of breakdown, and in the event of the brushes requiring renewal, one or two sets can be removed without affecting the working of the instrument. In Fig. 4 the method of connecting the transmitter to the rudder head is shown and speaks for itself. Fig. 5 is a diagrammatic view, showing the general principle of the receiving instruments. *A* is the ring of electro magnets with the interchanging poles. *B* is the soft iron rotor. The magnetic circuit is indicated by dotted lines for the two positions. Fig. 6 shows the connections between the transmitter and receiver.

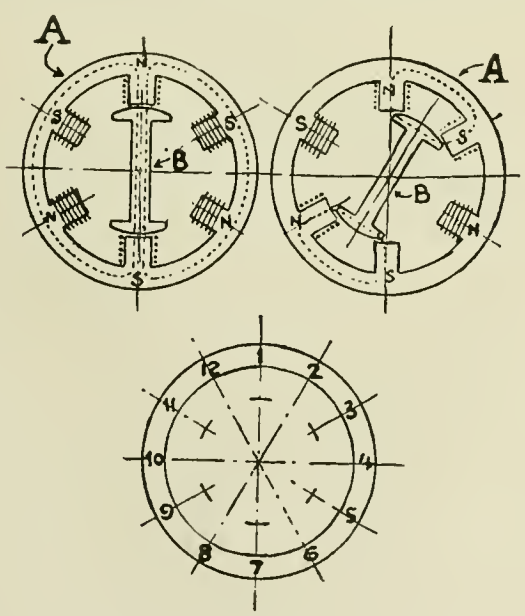


Fig. 6. Showing connections between Transmitter and Receiver.

The sole British agents for the apparatus are Messrs. Hogan & Wardrop, of 2, Gresham Buildings, Basinghall Street, London, E.C., who inform us that a number of vessels have been fitted with the instruments, including two vessels now building by Messrs. Wm. Hamilton & Co., Ltd, Port Glasgow.

LETTERS TO THE EDITOR. †

Re PROPOSED ALTERATIONS IN REGULATIONS FOR BOARD OF TRADE CERTIFICATES.

To the Editor of MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—May I trespass upon your valuable space to enter my protest against the proposed change in the Board of Trade regulations for the engineer's certificate.

I think there cannot be anyone who is not in entire agreement with the fundamental principles of the new regulations —more qualifying sea time, more theory. Every marine engineer, ashore or afloat, keenly realizes the value, to himself, of his sea-time, so that any suggested lengthening of the qualifying time can only be received with approbation. Again, every marine engineer realizes the absolute necessity of thoroughly understanding the underlying principles of the machinery under his care, his isolation brings this home to him most forcibly, therefore when the Board of Trade suggests a theoretical training as advisable, again we are all in agreement, but here comes the point, subtle and at the same time most pernicious. I refer to the substitution of three months in an approved school. Since when has the Board of Trade been able to instil practical experience by teaching theory? The 50 per cent. increased sea-time must either be necessary or unnecessary. Sea experience most certainly cannot be gained in any school, approved or otherwise. If eighteen months' increase is necessary, as we believe it to be, why remit one-sixth of this time? If, on the other hand, fifteen months' increase will meet the requirements of the case, why waste our time suggesting eighteen months? To me this appears an attempt to force engineers to uphold Council Schools or to penalize them if they refuse.

Whilst agreeing that theory is essential to the marine engineer, and this is proved by the number who sit for the extra certificate without the faintest hope of ever gaining any monetary advantage from it, ought we not to consider,

†The Editor does not hold himself responsible for the opinions expressed by his correspondents.

before we subscribe to the death warrant of the existing schools and of our own freedom of action, whether in the past we have found these schools incapable of training us in the required theory, that we should allow ourselves to be shepherded where our fatherly Board of Trade thinks we ought to go, instead of where our inclination and intelligence direct us?

My own experience of the existing schools is that they are very efficient. I am not aware that they take an average of three months to pass candidates for the 2nd or 1st class, and I may add that when I passed for my "extra" the school at which I trained sent up four pupils, all of whom passed. With three of us it was the first time of sitting; two of these pupils allowed themselves two months in school, while I took three months. We had, of course, been studying theory "*at*" sea in contradistinction to "instead of" and I do not think any of us had cause for complaint with the school. There can be no doubt upon this point, as the very existence of these schools depends upon their efficiency. If the Board of Trade require more theory they have only to enlarge that part of their examinations and no one would object. Surely it cannot matter to the Board of Trade whence a man obtains the requisite knowledge so long as he does obtain it, and it is for them to ascertain that he possesses this knowledge by examination.

Is it to be accepted, as one of your correspondents suggests, that it is a veiled acknowledgment of their incompetency to examine and that they desire to hide behind their bolstered up schools?

Sir, I consider these new regulations both arrogant and insolent. Arrogant in that they imply that the Board of Trade can force us, as a profession, to give up our freedom of action and accept that which the most inferior intellect must reject as absurd—that sea experience can be gained in a school-room. Insolent in that they imply that as a profession we have neither the intelligence to choose a suitable school nor sufficient interest in our work to obtain the necessary theory. Insolent again in the suggestion that our engineer examiners, the very pick of the marine engineers, are not competent to conduct the required examinations. This last implication is as absurd as the first, for we all know that these men are quite able to conduct examinations, no matter how deep in theory they may be.

If it is that the Board of Trade is desirous of rendering assistance to the Board of Education it behoves us to see that it is not done at the expense of the marine engineer's qualifications, and I would suggest that they find other excuses for giving Government grants to Council Schools.

Sir, I enclose my card and beg to subscribe myself

October 17, 1913. AN EXTRA CHIEF.

To the Editor of Marine Engineer and Naval Architect.

Dear Sir,—The various articles and letters that have appeared in your paper recently from time to time I have read with a considerable amount of interest, and should like to say that the strongest condemnation should be offered by all certified sea-going engineers to the proposal in the new Board of Trade regulations, whereby it is desired to substitute time at a technical school for actual time at sea. The proposal to increase the sea-going time from twelve to eighteen months must be approved by all engineers, for the responsibility thrust upon engineers at sea in modern steamships is far greater now than fifteen or twenty years ago, and the time to qualify for a certificate should not be curtailed in any way, as in my opinion one good smell of the strum box is worth more to an engineer than weeks of study in a comfortable chair.

I have no wish to condemn technical training in any way, rather the reverse, but what I do condemn is the proposal to substitute time spent at a technical school to count towards the time that should in all reason be spent at sea.—I am, dear sir, yours faithfully,

R. N. DUNCAN, M.I.Mar.E.

London, Oct. 15, 1913.

Dear Sir,—I have read your article in the July number and the subsequent correspondence in the later numbers concerning the new Board of Trade regulations for the marine engineers' examinations. As an old marine engineer, I feel I must join in protesting against these dangerous and, as it seems to me, ill-considered regulations. Your article and some of your correspondents deal with some of the phases of these regulations, but apart from the all-important point that there must be no substitution optional or otherwise for sea service, there is one other point I would like to see emphasized. The Board of Trade have examinations which are, or ought to be, based on years of experience in marine engineering. An engineer of the best type with his heart in his profession, will make good use of his time at sea; he will continue the studies of his apprenticeship, he will keep himself up-to-date by reading the technical journals, etc., so that he will be ready to sit for his examination almost as soon as he leaves his ship. Yet such a man will have to remain at sea three months longer than the careless individual who does not trouble to study during his sea service, but depends on a few months' cramming at school to get through his examination. Has this fact been realized by the Board of Trade? Training at a technical school is excellent and necessary, but this should be completed during the engineer's apprenticeship.—Yours faithfully,

London, Oct 15, 1913. AN EX-SUPERINTENDENT.

To the Editor of Marine Engineer and Naval Architect.

Dear Sir,—The correspondence in your columns *re* the new Board of Trade regulations for Marine Engineers' Certificates interests me greatly, for although it is some years since I left the sea, I still consider myself one of the cloth and remember that it was as a marine engineer that I really learnt my business.

The additional time in the engine room which the Board of Trade are going to require of candidates for their certificates, is, I think, a step in the right direction, considering the vast difference between a ship's machinery of to-day, and one of, say fifteen years ago, but, why after requiring this additional period of service at sea, the Board of Trade should offer an alternative which again reduces, or tends to partly reduce the new requirement of service, I fail to understand.

Nothing can take the place of the engine room in giving instruction and experience of the kind required to qualify an engineer for the duties and responsibilities of the senior positions of the ship's engineering staff—three months (or less) at a technical school however well equipped will do nothing towards giving the young engineer confidence and resource, qualities which are beyond estimation in times of abnormal circumstances. Efficient and economical working is also of the utmost importance, and I feel sure, the man to run his ship to the greatest satisfaction to his employers would be the one with the best engine room training, attached to a good ordinary engineering and mathematical knowledge and sound common sense. If, however, a higher grade in science and mathematics is deemed advisable, the Board of Trade can easily arrange for this in their examinations, without taking a slice off the needful sea-service.

A CENTRAL STATION ENGINEER.

London, S.W., October 23rd 1913.

To the Editor of Marine Engineer and Naval Architect.

FIRE EXTINCTION ON SHIPS.

Dear Sir,—The terrible accident to the *Volturno* has once again brought into prominence the inadequate and inefficient equipments for suppressing fires which are installed in many ships.

The methods of extinguishing fires on board ship may be classified as (1) Closing the hatches. (2) Flooding the holds with water. (3) Blowing in steam. (4) Blowing in inert gases.

Closing the hatches is not effective because it is impossible to make a tight joint, although at the beginning of a fire it may retard combustion somewhat.

Flooding with water is effective up to a certain point, but it has the disadvantages that—(a) The water takes a long time to percolate through closely packed cargo. (b) It may run into cargo which is not on fire. (c) By causing cargo to swell it may twist the framing of the ship. (d) If the water passes into a mass of incandescent material, especially burning coal, water gas is formed. (e) Water in contact with certain cargoes, such as carbide of calcium, gives off inflammable gases.

It has been suggested that the fire on the *Volturno* might have been got under if the pumps had been in a different place and water had been thrown into the holds in greater volume. There is, however, very grave danger in pumping

water into masses of incandescent material contained in holds, because as aforesaid, it may give off gases. For example, steam passing through incandescent coal gives off carbon monoxide, hydrogen, and carbon hydrogen compounds which are extremely explosive, and carbon monoxide is very poisonous. The explosion on the *Volturno* is supposed to have been due to water in contact with carbide of calcium, giving off acetylene gas. Certainly, if such material was carried in the hold, it is no wonder the ship was gutted, but it would not have burnt if extinction by inert gases had been tried.

Blowing steam into the cargo has the disadvantages that when so used there is less steam available for the propulsion of the ship, possibly at the very moment when great speed is most required. Further, the steam may not reach the seat of the fire, owing to condensation and its tendency to rise. The Rich system which uses steam has an indicating gear and the fire on the *Imperator* was indicated in good time by this apparatus. Of the three methods of employing inert gases the Gronwald system uses pure carbon dioxide from steel bottles When the fire starts the gas is projected by its own pressure into the cargo. An objection to this method is that the amount of carbon dioxide is limited to that in the bottles, also they are dangerous cargo if heated. The Clayton system uses sulphur dioxide gas made by burning raw sulphur in a special apparatus. Sulphur is easily carried, but some little time must elapse before the sulphur can be turned into gas and it might happen that the sulphur would give out. The Harker system makes use of the waste flue gases coming from the boiler furnaces. The gas is therefore always available for any length of time and in any quantity. Indeed, if the boilers are being forced for the purpose of propelling the ship at a greater speed in order to get to safety, then the extra flue gas makes it easier to suppress the fire.

In a paper which the writer read before the Institute of Marine Engineers in November, 1912, on " The Use of Gases on Ships for Fire Extinction and Fumigation "* all the above systems were compared and the conclusion arrived at by the writer was that the flue gas system gave most promise. Its capacity to immediately pour great volumes of waste gas into the holds and keep up the supply, so overcoming leakages, is very valuable.

No doubt the Sub-Committee which is enquiring into the subject of fires on ships will themselves thoroughly investigate the various systems of fire prevention.—Yours truly,

E. KILBURN SCOTT, A.M.Inst.C.E.

Osborne House, Belvedere, Kent.

* This paper was published in the Marine Engineer and Naval Architect, December, 1912 (*Ed.*).

(Correspondence continued page 141).

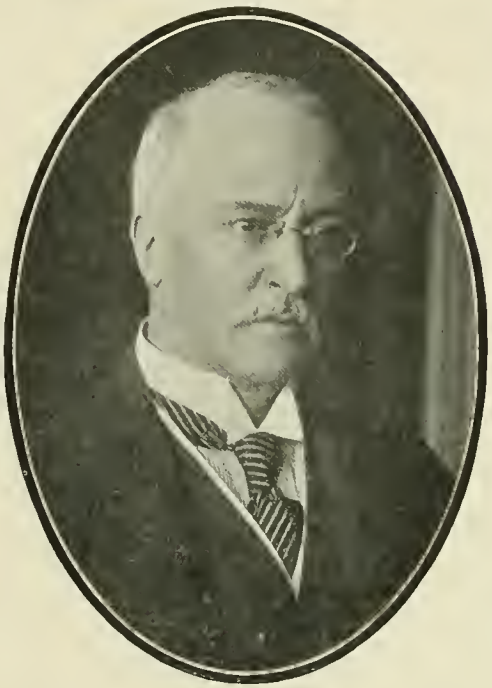
OBITUARY.

Dr. Rudolph Diesel.

It is with deep regret we have to record the death of Dr. Diesel, who disappeared from the Great Eastern Railway Co.'s steamer *Dresden* on her passage from Antwerp to Harwich on Monday night, September 29th. About a fortnight afterwards a body was recovered from the mouth of the Scheldt, on which were various articles which have since been identified by Dr. Diesel's son as belonging to his father.

Dr. Diesel was the son of German parents and was born in Paris in March, 1858. He commenced his education in Paris, but on the outbreak of the Franco-German War he went to Augsburg and thence to the Munich Technical College, where he graduated in 1879 and became assistant to Prof. von Linde. After a short period of practical work at Messrs. Sulzer Brothers' works at Winterthur, he became manager to a French company which manufactured the Von Linde refrigerating machinery.

The subject of obtaining a much higher efficiency in a prime mover than was possible in a steam engine had occupied Dr. Diesel's attention for many years, and in 1893 he published a book describing his work in this direction. Messrs. Krupp and the Augsburg-Nuremberg company rendered financial assistance in the pioneer work of experimenting, and he proved that pure air could be compressed to such a degree as to be capable of igniting the oil fuel. It was not, however, till 1897 that a reliable engine could be produced, which



Dr. Rudolph Diesel.

was the third of the series and was of eighteen horse-power. This was followed by the fourth engine of twenty-five horse-power, the first really commercial engine, and its design has been typical of all slow-speed stationary engines since built. The Diesel engine was adopted for boat propulsion in 1903 in France, where an engine of twenty horse-power was used on a canal boat, and since that date many engines have been built and installed on various boats, some of the later engines developing several hundred horse-power. It has been shown that the four-cycle engine does not lend itself for reversing so readily as the two-cycle engine, hence the latter is more in favour than the former for marine propulsion. Much experimenting has been carried on during the last two or three years to determine the largest amount of power a single cylinder is capable of transmitting by its mechanism, and these trials range from 1,000 to 2,000 horse-power. There is no doubt that the present state of progress was in a large measure due to Dr. Diesel's personal merits and his pluck, but much work still requires to be done and much money spent before the difficulties of a high-power heavy oil Diesel marine engine will be solved to enable manufacture on commercial lines. The English patents are owned by the Consolidated Diesel Engine Manufacturers, Ltd., whose works are at Ipswich.

It is indeed very regrettable that a life of so much usefulness and promise should have terminated so suddenly and under the particular circumstances, but Dr. Diesel's work will remain as a monument to his ingenuity and ability as an engineer.

Mr. J. A. Bowden.

The death of Mr. J. A. Bowden in the beginning of October, at the early age of fifty-five, has caused much regret on the north-east coast, where he was well known and esteemed in social and educational circles, as well as in engineering. Born at Portland in 1858, he served his apprenticeship in the Portsmouth Dockyard, and was transferred afterwards to Devonport. Receiving an appointment as outside manager from Messrs. Mordey, Carney & Co., he removed to Newport, and after some service on shore with this firm he went to sea in the Milburn Line. He was soon after appointed as outside manager for the North-Eastern Marine Engineering Co., and subsequently he joined Messrs. John Dickinson and Sons, Sunderland, and at the time of his death he was general manager of the works and had been with the firm for twenty years. He was associated closely with the Technical Education College, and gave every encouragement to the apprentices to take advantage of the facilities placed within their

Mr. J. A. Bowden.

reach of acquiring knowledge. Mr. Bowden was mindful of his privileges as well as of his duties, and in adding this tribute to his memory it will be noted that in being mindful of his privileges he was unselfish. Our sympathy is extended to Mrs. Bowden, her son and daughter in the serious loss they have sustained.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Messrs. Alex. Stephen & Sons, Ltd., of Linthouse shipbuilding works, were on every hand the recipients of unstinted praise for their latest production, the twin-screw steamer *Gelria*, on the occasion of the vessel's acceptance trial on the Firth of Clyde on October 8th, when a very large party of guests were on board. The *Gelria*, which has already been described in this journal, is not only the largest, but the most magnificent in every respect produced by the well-known Linthouse firm. A sister ship, the *Tubantua*, is on the stocks and will shortly be launched.

Messrs. Fleming & Ferguson, Paisley, have obtained from the Government of Queensland an order for a pilot steamer for the Port of Brisbane. The total landed cost of the vessel has been estimated at £28,500, but it is considered probable that the Government of Queensland may not be called upon to pay the import duty on the steamer. For the construction of the vessel there were nine tenders—two from the Southern States of Australia, one from Hong Kong, and the others from Great Britain. The Paisley firm have recently completed and put through practical tests a number of vessels which form units of one self-contained fleet of rather an interesting character. This fleet or plant is for reclamation purposes, and consists of five vessels (a reclamation steamer, a twin-screw tug and three 1,000-ton barges), and is intended for use at the port of Lagos, West Africa.

Messrs. William Denny & Brothers, Leven Shipyard, Dumbarton, consigned to the water on October 15th the large twin-screw steamer *Emperor Alexander III.*, the last of a quartette of similar vessels building on the Clyde to the order of the Russian Steam Navigation and Trading Co., Odessa. Two have been constructed by Messrs. John Brown & Co., Ltd., Clydebank, and the first of these—the *Emperor Peter the Great*—ran trials on the measured mile on October 20th. The other two, constructed by Messrs. Denny Brothers, named the *Empress Katerina II.* and the *Emperor Alexander III.*, are slightly behind the Clydebank productions in respect of progress, but on October 20th, the same date as the trial of the first Clydebank vessel, the *Empress Katerina II.*, was docked at Glasgow for hull cleaning prior to running her speed trials.

Messrs. Russell & Co., conjointly with Messrs. Dunlop, Bremner & Co., Port Glasgow, are now provided with a spacious wet basin, with adequate quayage and lifting appliances for the work of fitting out the vessels built at their yards. The basin is situated between the two shipyards and is available to both firms. The wharf in Messrs. Dunlop, Bremner & Co.'s yard has been raised and renewed over all its length, and strengthened by steel interlocking sheet piling, backed with concrete. The jetty is practically new, and for a good many months the vessels of both firms have been completed there. The scheme also includes a new railway, with lyes and loops, down the full length of the yard. At Messrs. Russell's yard a strong retaining wall of steel interlocking sheet piling has been formed at the bottom of the berths to allow of the dock being dredged to the depth of 20 ft. at low water. The wharf at Messrs. Russell's yard, which has been constructed entirely of concrete on the Hennibique system, with monolithic work all through, is the longest of its kind in Scotland, being 486 ft. in length. The next longest is 285 ft. The piles are of reinforced concrete, driven by hydraulic pressure, while the floor is 6 in. thick, which is equal to a bearing weight of 3 ft. 6 in. of masonry. The jetty is steel-laced, and the structure is designed to stand the poundage of strains and stresses. The longest pile driven was 60 ft. in blue clay, and the longest drive was 30 ft. in boulder clay. The west side of the wharf will be used for completing vessels, and there has been erected on that wharf a travelling crane, with a lifting capacity of 15 tons. On the east side steamers discharging plates and other materials will be berthed. For this work a 10-ton crane will be employed.

Messrs. Ferguson Brothers, Port Glasgow, at the end of September launched a self-propelling bucket-ladder dredger, described in our Launch columns, for the Clyde Lighthouse Trustees. The new dredger—very appropriately named *William H. Raeburn*, after the chairman of the Trust, the well-known Glasgow shipowner—is of the bow-well centre bucket-ladder type, and is 150 ft. in length, 34 ft. beam and 12 ft. depth. A second dredger and other dredging plant are on hand to the order of the Lighthouse Trustees.

Scott's Shipbuilding and Engineering Co., Greenock, have contracted with New York owners, through Messrs. Clark and Service, Glasgow, for the construction of a steamer about 345 ft. in length. Early in October the firm launched for the Holt Line fleet the *Helenus*, a passenger and cargo steamer of about 7,000 tons, and a similar vessel for the same fleet is now nearing completion on the stocks. Early in the month, also, the Scott Co.'s notable naval production, the super-"Dreadnought" *Ajax*, left their basin and proceeded on a short spin down the Firth, returning in the afternoon. Since then coaling operations have been carried out, and at the time of writing the vessel is about to proceed on her acceptance trials, following which she will leave for Devonport to be put into commission.

The Clan Line of Steamers has been much in evidence at the docks and quays of Glasgow Harbour during the latter part of September and October. The *Clan Gordon*, after extensive overhaul at the hands of Messrs. Alex. Stephen and Sons, loaded for Bombay about mid-month. Two new Clan liners, the *Clan MacQuarrie*, built by Messrs. A. Stephen and Sons, and the *Clan MacCorquadale*, built by Messrs. Charles Connell & Co., have now almost completed their fitting out. The managers of the Clan Line, Messrs. Cayzer, Irvine & Co., Glasgow, it is understood, have placed orders for three new steamers, one of which will be built in a Clyde yard—Messrs. Napier & Miller, Old Kilpatrick—the other two going to North-east Coast yards.

Messrs. Hawthorns & Co., Leith, have built and recently launched to the order of the British Admiralty a battle-practice target for the use of the Navy. The hull of the target, which is 160 ft. in length and 13 ft. in depth, is con-

structed so as to give the greatest possible resistance to shot and to float deeply. It has only about 18 in. of freeboard. Above the hull the target proper will be erected. The lower part of the hull consists of steel packed in timber and cork, and the upper part of Oregon pine. A similar target is under construction at the same yard.

New Dredger for Dundee.—At the last monthly meeting of Dundee Harbour Board, after some considerable discussion, it was decided to purchase new dredging plant. It transpired that unless the machinery of the present dredger was reconstructed, dredging could not be done to a greater depth than 26 ft. The new dredger, on the other hand, will go to a depth of 45 ft., and lift 500 tons per hour. The purchase of the new dredger was approved and some improvement in the manner of depositing the dredgings was also discussed.

New Engineering Laboratories at Dundee.—On Monday, 13th inst., Sir Alexander B. W. Kennedy, LL.D., F.R.S., opened, at University College, Dundee, the new engineering laboratories, which have been erected and equipped at a cost of about £16,000. The main building, two storeys in height, contains the lecture rooms, drawing offices, library and hydraulic laboratory. A feature worthy of note is a central tower, some 80 ft. high, which accommodates the fan and machinery for the forced ventilation of the building, and also contains a storage tank of 10,000 gallons capacity, from which the mains in the hydraulic laboratory are supplied. The east wing contains the heat engine laboratory and boiler house, the strength-material laboratory, the cement test-room and the workshop, the latter of which, situated above the engine room, is provided with lathes, planing and shaping machines, etc., and is used mainly for the manufacture and repair of experimental apparatus. The drawing department contains a collection of models, working drawings, etc., with the usual drawing tables and facilities for designing work.

Aluminium Works at Burntisland.—The British Aluminium Co. have decided to establish new works at Kirkton, Burntisland, Fifeshire. The site acquired extends to about 30 acres. When the works are in full operation between 300 and 400 men will be employed. It is intended to smelt the ore, and the aluminium obtained will be shipped to Norway for further treatment. The works are to be ready for occupation within eighteen months.

TEES AND THE HARTLEPOOLS.

(From our Own Correspondent.)

West Hartlepool.

Messrs. B. B. Murrell & Co. have sold the s.s. *Armenia*, 2,330 gross tons, to the Cross Steamship Co. (A. Richardson, manager), Newcastle, through Messrs. J. H. Elliot & Co., Newcastle-on-Tyne, for about £11,000. Messrs. Furness, Withy & Co. have sold the s.s. *Westhampton*, 1,860 gross tons, to Glasgow ship owners for about £24,000; also the *Hambleton Range* of 6,700 tons d.w. to Messrs. Esplen & Co., Liverpool, recently launched by Irvine's Shipbuilding and Dry Dock Co.

Messrs. W. Gray & Co., Ltd., continue to be very busy at both the old and new yards, and are reported to have secured the contract to build two cargo steamers, a repeat order for Scandinavian owners, and to have sold a large special boat to the British India Steam Navigation Co., Glasgow.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are very full up with both old and new work. Amongst the orders for new work is a small cargo boat of about 3,200 tons deadweight for the Baltic trade.

A remarkable piece of salvage work was successfully carried through by Messrs. G. Sivewright & Son in salving the s.s. *Coronation*, which was on the rocks near Whitby upwards of nine months, and after towing into West Hartlepool has been on fire through the upsetting of the oil used by the oil engines engaged in pumping to keep her afloat. She will shortly be open for tenders for renewals, which are estimated at about £20,000.

The Central Marine Engine Works of Messrs. W. Gray and Co. continue to be very busy. Besides engining all the boats building by the firm, there is an order for fitting their superheaters to two steamers to be built by them for Scandinavian owners.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton Yard, are as busy as ever. They are reported to have secured the contract to build two steamers, sister ships to the recently built transport liners of Messrs. Houlder Bros.

Messrs. Richardsons, Westgarth & Co. are very busy in all departments. Amongst the new orders is the complete installation of engines, boilers and the Contraflo system to a large twin-screw cargo steamer, to be built by Messrs. Sir Raylton Dixon & Co., Middlesbrough, to Messrs. Esplen & Sons', Liverpool, specification; also the engines and boilers for two cargo steamers to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co., one at the Harbour Dockyard and one at the Middleton yard. They are also very busy with condensing plants and in their turbine department.

Whitby.

The International Line Steamship Co., Ltd. (C. Marwood, manager), have sold the *Golden Cross*, 3,014 gross tons, to Greeks for £13,000.

Middlesbrough.

Messrs. Smith's Dry Dock Co., South Bank, continue to have a large amount of docking, repairing and building. They are reported to have secured the contract to build a powerful tug.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, have secured the contract to build a large steamer about 530 ft. long for the Federal Steam Navigation Co., to be fitted with refrigerating machinery; also a twin-screw steamer for the Union Steamship Co., New Zealand.

Messrs. W. Harkess & Sons, Ltd., continue to be well supplied with both old and new work. They have secured the contract to build a small cargo steamer for Liverpool owners.

Messrs. Richardsons, Westgarth & Co. are still very busy on both land and marine work, and are reported to have secured the contract to engine a vessel building locally. They are very busy extending the heavy stamping department.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. have a large amount of work on hand. Several orders for cargo steamers are now in the market and the Company is reported to have secured an order to build a medium-sized cargo steamer.

Messrs. Craig, Taylor & Co. have sufficient work to keep them busy for a long time. They have just secured the order from Terneuzen shipowners for a cargo steamer of about 7,200 tons deadweight.

Messrs. R. Ropner & Sons are very busy. They have recently booked the contract to build a cargo steamer 430 ft. long for Messrs. Chalmers & Co., Newcastle-on-Tyne, also a cargo steamer of about 10,000 tons deadweight for Messrs. W. R. Smith & Co., Cardiff. This firm will be very busy for upwards of a year.

Messrs. Blair & Co. have a large amount of work on hand, mostly for local yards. They have secured the contract to supply the engines and boilers for the steamer to be built by Messrs. R. Ropner & Son for Messrs. Chalmers & Co., Newcastle. They are very busy in all departments owing to the very large amount of work on hand.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull Shipping.—The docks have been kept very busy during last month, several very large steamers, including P. & O. steamers, have discharged valuable cargoes from Australia and colonies. In addition many large steamers have arrived from Calcutta and Far East and River Plate ports. The dockers have apparently established the Saturday half-holiday. The Wilson Line steamers in the Atlantic trade are doing well, and the Company has established a weekly service to Boston and New York. The Furness Line have commenced a weekly service to Canada, Montreal and Quebec and by the great amount of tonnage they have on this particular service they seem to have built up a splendid connection. It is understood that all the new quay space in the new joint dock has been allotted to different steamship companies.

The Baltic Season is fast coming to a finish for this year. It has been a wonderful season for the timber trade, the

great piles of pit props on the Dock Quays is a wonderful sight, and the Railway Companies at times have felt the want of rolling stock, to convey the props into the Midlands.

River Side Quay.—The passenger season from the River Side Quay is finished for the tourist season; the L. & Y. Railway twin-screw steamer *Duke of Clarence* and the *Magic* are taken off and have gone to Fleetwood to lie up and go under repairs to prepare for next season. All the passenger boats have done well this season, carrying a large number of people to the Ghent Exhibition, Norway and Sweden.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are very busy on new steamers building for local and foreign firms, and are still booking fresh contracts. The s.s. *New Sweden* has gone through her official trial and all went off satisfactorily, the owners being thoroughly satisfied. The patent slips of the firm are kept well employed and some steamers are in undergoing very exten ive repairs.

Messrs. Cooper & Co., Ltd., engineers, etc., Neptune Engine Works, have had a fairly good month on repairs on several local and outside steamers, also graving dock work, and enquiries have been received for the Company's patent propellers from home and foreign steamship companies. The branch shop at Alexandra Dock has also had a fair amount of repair work, and the firm's own graving dock has been kept fully employed during the month, and is well booked ahead.

Thomas Tate, engineer and boilermaker, has effected extensive repairs to the sea-going tug *Tyre*, fitting new boiler mountings and seatings and floors. The engines have also been thoroughly overhauled. The sea tug *Pilot* has had extensive boiler and engine repairs, and several coasting steamers have undergone repairs. The firm can guarantee quick despatch of work.

Messrs. Stewart & Craig, engineers and ship repairers, have been fully employed in all departments during the month, and on the following steamers: *King Howel*, engine room and deck repairs; and the s.s. *King George*. The sailing vessels *Largiemore* and *Charles Gunond* and a number of other vessels have had small repairs effected.

North-East Coast Engineering Works (Hull), Ltd., engineers and ship repairers, have been busy during the month, and have effected engine room and deck repairs in several coasting steamers. A number of steamers have been docked and repairs done on s.s. *Eir* and s.s *Sydenberg*, etc. A fair amount of work is expected during November.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, have booked many orders for boilers and machinery for trawlers, and for the firm's patent compound trawl winch. They have orders that will last well into next year and are now fitting out trawlers at Queen's Dock for Hull, Grimsby, Fleetwood, etc. The outside staff at the branch shop at Alexandra Dock is fully employed on different steamers.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are exceedingly busy at present and will be so well into the end of another year, and are still booking orders. All the different departments are working at full pressure on boilers and machinery for trawlers and coasters, and engines for a steamer building at Dundee for the Wilson Line. The outside staff are busy fitting boilers and engines in trawlers for Hull and Grimsby owners and others preparing for trial trips. The branch shop at Alexandra Dock is very busy with graving dock work and also opening-out boilers and engines for Lloyd's and British Corporation Surveys. The firm have a large number of orders for their steering gear from owners and shipbuilders at home and abroad.

Messrs. Woodall & Co., engineers, have been fairly busy during the month, more particularly on Swedish and Danish steamers and local steamers, doing repair work, deck and below. The smiths' shop is kept very busy on small forgings for small shipyards.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are still booking orders for tugs, trawlers and coasters for different home ports and have plenty of work to last well into next year. Several trawlers are now in Hull Docks receiving boilers and machinery, etc., fitting out, and getting ready for trial trips. The machinery and boilers are built and fitted by the well-known engine builders, Messrs. Amos and Smith, Ltd., and Messrs. C. D. Holmes, Ltd.

H. Scarr, shipbuilder, Hessle.—This yard is booked up well into next year for tug boats, lighters, etc., and prospects seem good.

The late "Dobson's", shipbuilders, Hessle.—This yard has now been taken over by local people and all buildings, machinery, etc., are being thoroughly overhauled before orders will be taken. A very large suction gas plant, with powerful engine, is being installed, and the yard will be equipped with all up-to-date machinery, etc., for quickly dealing with orders.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. J. I. Thornycroft & Co., Ltd., Southampton.—H.M. torpedo-boat destroyers *Paragon*, *Porpoise*, *Unity*, *Victor*, *Lance* and *Lookout*, *Meteor* and *Mastiff* are all in progress. The *Lance* and *Lookout* were originally the *Daring* and *Dragon*, and have now been renamed. The *Meteor* and *Mastiff* are the names allocated to the two new destroyers of this year's programme, for which the order was recently received. The passenger and cargo steamer *St. Patrick*, for Trinidad, reached her destination last month, after a very successful voyage. Good progress has been made during the past month with the Canadian customs cruiser *Margaret*; also several motor boats have completed successful trials, and others are nearing completion. A considerable number of general engineering jobs have been carried out and the repairs department continues to be well occupied. Amongst the orders received during the past month are a number for installations of the Thornycroft patent oil-burning apparatus. The orders placed for the installation of this system during the past few weeks total three-quarters of a million horse-power.

New Canadian West Indies Mail and Passenger Service.—A contract has been concluded between the Royal Mail Steam Packet Co. and the Canadian Minister of Trade and Commerce for a mail, passenger and cargo service between Canada and the British West Indies. It is understood locally that the subsidy is to be £70,000 per annum for five years. The steamers to be employed in the service are the *Cobequid*, *Caraquet*, *Chaleur* and *Chignecto*, all of approximately 5,000 tons. The two former vessels are fitting out in London and the two latter at Southampton. The service will be inaugurated by the sailing of the *Cobequid* from St. John, New Brunswick, on the 23rd November, to be followed at fortnightly intervals by the *Caraquet*, *Chaleur* and *Chignecto*.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—Good progress was made during the past month with all the contracts in hand throughout the various departments, and up to going to press no further orders of importance had been booked. Several steam yachts are undergoing survey, painting, etc., including the s.y. *Ilex*, which is being prepared for a short cruise.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—The British torpedo-boat destroyers *Redgauntlet* and *Rosalind* (1912-13 programme) have been renamed *Laurel* and *Liberty* respectively. The *Liberty* is fitting out and the *Laurel* is completing trials. The firm have just delivered two 40-ft. motor pilot launches to the order of the Aden Port Trust.

Messrs. Harland & Wolff, Southampton.—The repairs and overhaul to the Compagnie Générale Transatlantique *France* were completed last month, and the vessel returned to the Continent. The firm will this month take in hand the winter overhauls of the vessels of the White Star and American lines, the first vessel being the *St. Paul*, which will be out of the sailing list till the early part of December, after which she takes up her position in the mid-week sailings of the White Star Line. During the slack season the Companies mentioned run a combined service, which begins this month, when the American Line boats are held back to take the mid-week White Star sailings. The vessels of the Atlantic Transport Co. will also call here as necessary on the Saturdays. Under this arrangement the *Majestic* will "lie up" for about two months, also the *Olympic* will be off the service for one month. She completes her December voyage on the 20th of that month, and returns to her position on the list on the 21st January. This interchange of steamers continues till March, when the separate services are again resumed.

THAMES.

(From our Own Correspondent.)

New Tonnage.—Among new vessels reported we notice the *Andes*, constructed by Messrs. Harland & Wolff, and intended for the Royal Mail Steamship Co.'s South American service, which we have previously noticed. This vessel is nearly 606 ft. long by 67 ft. beam and has a gross tonnage of 15,620. She is a triple-screw vessel, having a combination of reciprocating and turbine engines. There is also extensive refrigerating machinery. A feature is the luxurious passenger accommodation. Another vessel for this Company is that constructed by Messrs. Workman, Clark & Co., and named the *Cardiganshire*. She is a finely modelled twin-screw boat of over 9,000 tons gross and fitted with all the latest appliances for the Company's Eastern service. She will leave London on her maiden voyage on December 19th. For the P. & O. Co. there was launched at Greenock recently the *Berrima*, which is intended for the Company's branch service to Australia *via* the Cape. The vessel is a sister to the *Beltana*, *Ballarat* and *Benalla*, and is of 11,000 tons, and classed 100 A1 at Lloyd's. This Company is also constructing six new steamers of the "K" class, of which the first, the *Khiva*, was recently launched. These vessels are intended for the Company's intermediate service to India, China and Japan, and are specially designed to provide superior accommodation for the passengers. The gross measurement of these vessels is 9,000 tons, and their propelling machinery will consist of two sets of quadruple-expansion engines of 9,000 h.p. This Company has in course of construction 87,000 tons of new shipping.

The Shell Transport and Trading Co.—This Company at its annual meeting presented a very favourable report. The nett profits have increased by one million over those of the previous year.

The Thames Ironworks Site.—A report is current that the Great Eastern Railway have acquired the whole of the ground formerly occupied by the Thames Ironworks, and this seems likely in view of the contiguity of the Company's lines to the site of this once flourishing concern, the abolition of which is said to have wrought ruin to the neighbourhood and its traders.

The Albert Dock Strike.—The latest example of the strike fever is that of the navvies on the new dock works. The excavation has proceeded to a considerable extent, and it has fortunately been arranged not to stop pumping, so that there is no actual danger of flooding taking place. Messrs. Pearson, the contractors, have never had a strike before on any of the large undertakings for which they have been responsible, and they decline to be governed by any agreements which have been entered into by builders, claiming to be in a different position altogether. Meanwhile the dock works are in a state of suspended animation.

Lloyd's List.—After the 30th June next Lloyd's List belonging to the Corporation of Lloyd's, and which for some years has been published by the Shipping and Mercantile Gazette, will be issued by the Committee themselves as a separate morning paper. Lloyd's Weekly Shipping Index will also be published by the Committee, and the shipping intelligence collected by Lloyd's will after the above date be published only in this manner.

Training of Boy Sailors.—The National Committee of Sea Training were to have a conference at the L.C.C. Council Chamber towards the end of October, and satisfaction is expressed at the fact that an Exchequer grant has been made to sea-training establishments to be subsequently supplemented by grants from local education authorities. The matter of the training of the boy sailor is therefore receiving proper encouragement at the present time.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

To the Mersey belongs the distinction of having completely equipped one of the largest super-"Dreadnoughts," including dry docking, entirely in the hands of the builders.

Messrs. Cammell, Laird & Co.—H.M.S. *Audacious* passed successfully through her official inspection and acceptance trial and was taken into commission by Captain C. F. Dampier, R.N., and left for Portsmouth on October 15th. Much satisfaction is felt locally by the completion of this vessel, the resources of the Mersey having been thus proved to be capable of executing the largest undertakings. The steamer *Khiva*, launched recently, has received her machinery and is now being completed in the Wet Basin. These vessels, of which class Messrs. Cammell, Laird & Co. are constructing four, are designed to carry seventy-nine first-class and sixty-eight second-class passengers, and will also carry about 10,200 tons deadweight on a load draught of about 28 ft. The design has been carried out under the supervision of Messrs. Deane & Leslie, the naval architect and superintendent engineer to the Company respectively, and the construction is being carried out under the care of Captain Henning and Mr. J. T. Smith, resident inspector. Rapid progress is being made with the many important contracts in hand, including H.M. destroyer *Garland*. The repair department have been well employed, amongst other steamers the Houston liner *Honorius* having extensive repairs carried out.

Messrs. H. & C. Grayson.—The Brazilian steamer *Gorjez* has left this firm's hands and sailed for Para, having been ashore in December last, very extensive repairs having been carried out. The Trinity House lightship is making good progress towards the launching stage at Garston. The *Teakwood* is still in hand for extensive alterations in the Langton Dock. At Birkenhead the *La Marguerite* is under repair after the close of the North Wales season, also the *Bernard*, *Herbert* and *Queen*.

The Manchester Ship Canal.—The far-sighted policy which inangurated this bold revolution as regards the transport facilities of Manchester seems to be now well on the road to financial and practical success. A new dock is contemplated which is to cost £1,000,000, whilst the Trafford Park estate, which has a frontage of three miles on the canal, now contains the works of close upon 100 firms, and others are negotiating. The canal has now been opened for traffic nineteen years, a steamer of 12,500 tons gross has passed through the waterway, and Manchester has taken fourth place amongst British ports. In 1902 the tonnage dealt with was 3,418,059 and the revenue £358,491. The corresponding figures last year were 5,339,884 tons and £605,179. The dividend on the five million invested by the Corporation is now being met, while the ordinary shareholders may shortly expect to receive a dividend.

Birkenhead Chamber of Commerce.—At a recent meeting of the Birkenhead Chamber of Commerce the railway and transport facilities of the port generally were discussed. Some fifteen years ago a project was made public by Messrs. Wood & Birdie, civil engineers, for the construction of a bridge across the Mersey between Liverpool and Birkenhead, consisting of a double road for vehicular traffic, a platform for pedestrian traffic, and also a road along the top, the construction being of the cantilever type. It was decided to discuss the matter further with the Liverpool Chamber before making any official representations.

The Liscard Sea Training Homes.—The good work being carried on of a national character by this Institution was recently given prominence to by the presentation of two gold medals to boys now being trained for the sea. Sir Harwood Banner, M.P., presented George Dollins with the president's medal for sea training, on the recommendation of his captain and officers, whilst the chairman's medal was presented by the Duke of Connaught at the landing stage to the lad credited with the highest efficiency in the Institution. The latter ceremony took place before the Duke's embarkation on the *Empress of Britain*.

Canadian Pacific Railway Co.—This Company, in the death of Mr. F. W. Forster, have lost one who was deservedly popular amongst the shipping community. Mr. Forster had for some time held the position of Liverpool agent for the Company. Captain J. V. Forster has recently been appointed to the position of marine superintendent to the Company in Liverpool in succession to Captain H. Mowatt. Captain Wm. Stewart, who retired in 1907, as commander of the *Empress of Britain*, died at Wallasey on October 12th, being in his 74th year. Captain Stewart was one of the St. Lawrence pioneers.

The St. Lawrence Route.—It is reported that the Canadian marine department are inviting tenders for an ice breaker to cost £150,000, and which will be the second largest yet constructed. It is estimated that by the use of such a vessel the St. Lawrence will be kept navigable up to Montreal until at least the end of January. It is rumoured that this contract may be placed with the establishment of Messrs. Vickers at Montreal.

The Gladstone Dock.—The Leyland liner *Median* discharged a cargo of cotton from Charlestown whilst lying in this dock on October 13th. This is the first vessel to use this dock, recently opened by the King during his visit to the city.

White Star Line.—The *Ceramic* arrived at Albany on August 25th, having covered the whole distance on her maiden voyage at the speed of 15¼ knots. At this port a civic reception was given to Commander J. Stivey, R.N.R., and his officers.

Cunard Line.—The *Caronia* and *Carmania*, it is expected, will be placed upon the Boston-Liverpool route next March, thus supplementing the service now carried on by the *Franconia* and *Laconia*.

Booth Line.—The s.s. *Hildebrand* left Liverpool on Sept. 21st for Manaos, *via* Spain and Portugal. This vessel is the first of this Company's fleet to call at Plymouth on the outward passage. This departure by the Booth Line will greatly benefit passengers from the south of England.

The Mersey Docks and Harbour Board.—Mr. James Halsall, who has seen sixty years' service with the Dock Board, has retired from the position of principal of the rates and dues department. Mr. J. W. Kewley has been appointed to succeed Mr. Halsall. The Johnston Liner *Ulstermore*, which broke her back and now lies in the Revetment is being removed by dynamite piecemeal, in order to preserve the Revetment from injury.

A Rapid Boat Lowering Gear.—A demonstration of the capabilities of the Colegrave boat gear was given early in October on board the White Star liner *Arabic*, lying in the Canada Dock, Liverpool. Practical illustrations of rapid lowering and raising of boats were carried out before a representative gathering of representatives of the leading shipping companies of the port, including the Cunard, White Star, Booth and Leyland Lines, etc., also Mr. C. Gray, Board of Trade. The fact that Messrs. Bullivant & Co. have undertaken the manufacture of this gear is a guarantee of its efficiency, while Mr. Jonathan Armstrong, the Liverpool representative of Messrs. Bullivant & Co., is taking an active part in the introduction of this speciality.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The life of the shipbuilder in these busy times is one of strenuousness. There is briskness in every department of Messrs. Vickers' works, so full is the programme of construction in the hands of the firm, and so great the desire to deliver orders up to the contract time. This has not been possible in all cases, as there is need of more men, skilled and unskilled, to do the work, and as the shipbuilding trade is brisk throughout the country men are difficult to get hold of. Further, there is the need in Barrow of at least another two thousand working men's dwellings to house the men at present employed and others the firm are ready to employ, so soon as plenty of houses can be built for their accommodation. The builders' lock-out has fortunately been settled and all the trades have resumed work. They have plenty of it to be going on with, and there are still to follow other buildings requisite to make the town comfortable and to prevent the overcrowding which is taking place, with several families in one house in many instances. Again, it is certain that the output of work at Barrow may be expected to be all the greater if more men are employed. Men connected with the shipbuilding trade like to live in Barrow, which is a modern town possessing good broad streets and houses which are very convenient and pleasant to live in.

Prospective New Business.—There is every prospect that two good orders will shortly come to Barrow. One is said to be a new and very powerful battleship for the Japanese Navy, and the second is one or more cruisers for the Peruvian Navy. Messrs. Vickers, Ltd., have already done large business with both these Powers. Two battleships, the *Mikasa*, Admiral Toga's flagship, and the *Katori* have been built for Japan, and latterly the *Kongo*, the most powerful battle-cruiser afloat, has been delivered to the Far East. The firm have also built and delivered two submarines, and they have also done a deal of other work for the Japanese Navy. Messrs. Vickers, Ltd., have built for the Peruvians two very successful cruisers of the scout class, and it is known that the local firm are the lowest tenderers in the competition for the cruisers now required. It is expected that at no distant date the orders for these ships will come to the Barrow firm. Room for the Japanese vessel will be found on the ways now occupied by the British "Dreadnought" *Emperor of India*.

Work in Progress.—A very large number of men are employed in the construction of the *Emperor of India*, which is to be launched on the 27th of November. A large tonnage of metal has to be built into this ship before it is possible to launch her, and the greatest activity is to be seen in order that the date fixed may be utilized for the launch. The material for the new British battleship *Revenge* has been ordered, and some of it has been delivered. The keel of the vessel will be laid in the course of a few days. The building of the two light cruisers *Phaeton* and *Penelope* has made great progress during the month. The new section of the Brazilian dock has been started on the ways from which the Argentine floating dock was launched during the month, and the latter is now on her way to Buenos Ayres in charge of two powerful Dutch tugs. The submarine department at Barrow is very fully charged with work, and some of the "E" class of vessel have lately been launched. Attention is being given to the building of an even larger submarine, and it is expected that later on orders will be given out for a number of these powerful and destructive vessels. On the engineering side of Messrs. Vickers' works there is any amount of business in hand, both in the marine shops and in the gun-mounting department. During the month highly successful experiments have been completed with a heavy oil engine, which has given very satisfactory and very economic results. The engine ran first of all for 150 hours, and afterwards continued running for several days. It is believed this engine will mark a new and interesting departure in mechanics, and more will be heard of it by and by.

Labour Troubles.—Every week brings in its harvest of labour troubles at the works of Messrs. Vickers, Ltd. Efforts are being made to come to an arrangement with the Boilermakers' Society for the members of that body to put in a reasonable amount of overtime at their employment, but it has been intimated that the executive of the Society are against overtime being worked at all. Some of the men are, however, in favour of latitude within limits being allowed to the members, and probably in the end that course will be adopted. The members of the Amalgamated Society of Engineers in employ at Messrs. Vickers' shipyard have given six months' notice of a demand for an increase of wages from an average of 36/6 per week to £2 2s. per week, to come in force on the 31st of March next. That is the date when the agreement for five years terminates. The demand includes fitters, turners, pattern makers, smiths, brass finishers and machine men. There are upwards of 2,500 men of these classes, members of the Amalgamated Society of Engineers, employed by the Vickers' firm.

The Brazilian Monitors.—Some trouble has arisen in the trials of the *Javery*, the first of the three river monitors building at Barrow for the Brazilian Government. She steers very well, but will not back water, and it is difficult to turn her round. This is doubtless because her rudders aft are enclosed in tunnels, which makes it difficult for the vessel to go astern. Some alterations in design will be necessary, not only to the *Javary*, but to her two sister ships, which have been launched and are now being fitted up in the docks at Barrow. Several of Messrs. Vickers' men have gone to the Clyde to deal with the alterations the experts think to be necessary to make her a satisfactory ship.

BELFAST.

(*From our Own Correspondent.*)

Work in Progress.—The twenty-seven steamers at present under construction in Belfast represent an aggregate gross tonnage of 324,640; the average size of vessel is thus over 12,000 tons. The giants building for the White Star, Red Star, and Holland-America lines are, of course, largely responsible for such high figures; still, for some years past, the launch of a vessel of under 5,000 tons from the Lagan yards has been a rare event, and at no period during the last two or three years would the average fall far short of 10,000 tons.

Messrs. Harland & Wolff.—On 2nd October, the triple-screw mail and passenger liner *Ordūna* was launched. The event was notable, having regard to the fact that this vessel is the largest yet built at the south end of the Queen's Island. Vessels built on the inner slips at this end have to be launched into Abercorn Basin, which allows but a very small margin for checking purposes, but the putting of the *Ordūna* into the water was accomplished without a hitch, the vessel being brought to a standstill almost immediately her forefoot had left the ways. The *Ordūna*, full particulars of which appear elsewhere, has been built for the Pacific Steam Navigation Co.'s service to the East and West coasts of South America. The Atlantic Transport Co.'s new steamer *Maryland* has been dry-docked and is just about ready for sea. Messrs. Harland & Wolff have two more vessels in hand for the same owners. With regard to the reference in last month's notes, to the rumour that Messrs. Harland & Wolff had acquired Messrs. Workman, Clark & Co.'s south yard, the correctness of the report has since been denied.

Messrs. Workman, Clark & Co. have close on 40,000 tons of new shipping at the fitting-out wharves. These are the Holt liners *Ulysses* and *Phemius*, of 14,500 and 6,700 gross tonnage respectively; the twin-screw fruit steamer *Calamares* of 8,000 tons, and the Royal Mail Steam Packet Co.'s *Cardiganshire* of 10,500 tons. The last-named was launched from the builder's south yard on 30th September. The propelling machinery consists of two sets of triple-expansion engines, to which steam is supplied by two double-ended and two single-ended boilers working under forced draught.

Harbour Undertakings.—Messrs. K. L. Kalis Zoon & Co., Sliedrecht, Holland, have secured from the Belfast Harbour Commissioners the contracts for various dredging and reclaiming operations, *viz.*, for definite dredging, conveying and depositing, at £31,875; and for contingent dredging, conveying and depositing, namely, in Musgrave Channel, if carried out, for the sum of £9,917; in Victoria Channel, if carried out, for the sum of £1,115; and in the embayment opposite the 600-ft. wharf northwards of the new graving dock, if carried out, for the sum of £1,417. The Commissioners may carry out any, all or none of the contingent works. Messrs. Kalis Zoon & Co. have previously executed important contracts in Belfast Harbour; it was they who made the deep-water turning basin for the *Titanic* and *Olympic*, and dredged the Victoria Channel deeper to allow of the departure of these vessels from the port. The Commissioners have agreed to proceed with the proposed development of the Musgrave Channel. The south end of the channel is to be made 100 ft. wider, and dredged deeper; a new wharf 300 ft. long will be constructed on the east side, and a jetty 550 ft. long is to be erected in the middle of the channel, which will mainly be used as a fitting-out wharf. The estimated cost of these undertakings is £45,000, and for this amount Messrs. Harland & Wolff have arranged to take up harbour stock on the same basis as in the previous transaction—namely, 95 per cent. The Harbour Commissioners are to be highly commended for the manner in which they are meeting the wishes of the local shipbuilders.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff and Barry.

THE ship-repairing trade in the Bristol Channel ports has been characterized during the past month by dulness of employment. All the dry docks, without exception, have been very quietly engaged, and owing to the spell of fine weather obtaining here recently, there does not at present seem any hope of a revival of business taking place in the near future. The slackness of trade is, of course, accentuated by the slow arrival of the tonnage necessary to provide work, but in the ordinary course the near approach of the winter should do much to repair the fortunes of this particular trade. The firms concerned, however, view the present period of inactivity with equanimity, it being generally regarded as only of a temporary nature.

Mountstuart Dry Docks, Ltd.—With this prominent firm trade has been somewhat quieter than usual, not many cases of heavy damage having been dealt with. At the same time a considerable number of ships have been docked for painting and sundry repairs. Among the cases of damage repairs may be mentioned the extensive bottom repairs to the steamer *Saint Winifred* of Liverpool, and the *Caroline E. de Perez* with bow damage and deck work.

The Channel Company and its various associated concerns have had a good share of the available work, but the principal portion has been of the ordinary docking and minor repair type.

Messrs. Shearman secured a number of steamers for overhaul and consequently were well engaged throughout an extremely quiet time.

The only other job of importance in Cardiff was the extensive overhaul to the Belfast steamer *Belfast* by Messrs. T. Diamond & Co. About twenty plates were renewed on the hull of the steamer, as well as numerous internal repairs.

At **Barry** the same tale of inactivity has been generally reported, but as an exception the firm of C. H. Bailey passed a large number of vessels through their hands, the work executed by this firm including heavy stem damage to the steamer *Gwent*, of Radcliffe's fleet, arising out of a collision; extensive plating amidships on steamer *Beechtree*, and a renovation of the steamer *Polurrian*, which encountered heavy weather.

The establishments at the other ports of the Bristol Channel were suffering from inactivity, and in general were sparsely employed.

Star of India.—During the past week this splendid specimen of what a modern first-class cargo steamer should be has been berthed in Barry Dock. She is the most recent addition to the well-known Star Line fleet of Messrs. James P. Corry and Co., of Belfast and London, and is engaged in the carriage of frozen produce from the colonies. Her appearance in the dock forming, as she did, such a contrast to the ordinary run of vessels frequenting Bristol Channel ports, gave rise to many expressions of admiration from the shipping fraternity. Her wireless equipment also came in for a share of comment, as well as the excellently arranged deck machinery.

Bristol Docks.—The dock authorities at Bristol are now awakening to the urgent need for re-organization and extension of their various warehouses and equipment for cargo handling. The grain, refrigerated produce and oil trades are rapidly expanding, and provision must be made for present and anticipated future requirements if the port is to retain the trade which it now possesses.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Absirtea.—On August 15th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a fine and handsomely modelled single-deck screw steamer of the following dimensions:—382 ft. by 51 ft. 4½ in. by 26 ft. 6 in. moulded. She is built of steel to the highest class in Lloyd's Registry, under special survey, and has several important additions to the owner's special requirements. She has poop, long bridge and forecastle combined and very large water ballast capacity in double bottom fore and aft and in peaks. She is fully equipped with all the latest and best types of special machinery for the general equipment usual for this class of steamer, and for rapid loading and discharging. The steamer is specially adapted for the Eastern, Gulf, Plate and general trades, and has very large cubic capacity. She is fitted throughout with shifting boards, etc., for the carriage of grain. Special attention has been given to the accommodation for the master, officers and crew, who are all provided with very superior rooms and comfortable quarters, the master, officers and engineers being on bridge deck amidships, and the crew in the poop. Her engines have been constructed by the

North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 26 in., 42½ in., 69½ in. by 45 in., with two large boilers working at 180 lbs. pressure, an additional boiler being supplied for cargo and general purposes by Messrs. Thomas Sudron & Co., Ltd., Stockton. The vessel has been built to the order of G. L. Premuda, Esq., of Trieste, under the superintendence of Messrs. Rusden & Baird, of North Shields. At the trial trip, which took place on October 18th, a speed of 10½ knots was maintained and everything proved very satisfactory.

Dunsley.—On August 18th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Dunsley*, which they have built for the London and Northern Steamship Co., Ltd., Messrs. Pyman Bros., London, managers. The vessel is of the shelter-deck type and will take the highest class in Lloyd's Register. Her dimensions are :—Length, overall, 423 ft. ; breadth, 55 ft., and depth, 26 ft. 10 in. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., are in houses on the shelter deck, the sailors' accommodation forward and the firemen aft. The hull is built with deep bulb-angle frames dispensing with hold beams and leaving large clear holds, cellular double bottom fore and aft-peak ballast tanks ; ten steam winches, derrick tables and outriggers, double derricks at each hatch, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, fresh-water distiller, steel grain divisions, stockless anchors, telescopic masts, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 28 in., 45 in. and 75 in. diameter, with a piston stroke of 51 in. and four large steel boilers for a working pressure of 180 lbs. per sq. in. The ship and machinery have been built under the superintendence of Mr. R. T. Rutherford on behalf of the owners. The trial trip took place on October 16th, an average speed of 12 knots being attained. Captain Arkley will command the vessel.

Solimoes.—On August 19th, there was launched from Messrs. Vickers' Shipyard, Barrow, the second of the three river monitors building by that firm for the Brazilian Government. She was named *Solimoes*, and was launched broadside into the water. The vessel, which is intended for river work in Brazil along with her two sister ships, has to be delivered within the next few months to Rio de Janeiro. The third vessel will soon be launched. All three craft are well armed, and being shallow can navigate the rivers of Brazil well into the interior of the country.

Savan.—On August 19th, there was launched from the Shipbuilding Yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a new screw steamer, built to the order of Messrs. Scrutton, Sons & Co., London, for their "Direct" Line. The vessel is of the following dimensions :—Length 381 ft. by 50 ft. 4 in. by 28 ft. 2½ in., and has been built to Lloyd's highest class on the spar deck rule, with exceptionally high 'tween decks for the West Indian trade, the arrangements generally, and the facilities for working cargo, etc., having been specially designed to meet the requirements of this particular trade, and special attention has also been paid to the ventilation throughout the ship. A double bottom is fitted for carrying oil for fuel, or water ballast. The vessel is supplied with eleven steam winches, and eighteen derricks worked from cross-trees and tables on the masts, and in addition a heavy derrick capable of lifting twenty tons. She will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 28 in., 46 in. and 75 in. with 48 ins. stroke, supplied with steam from two large steel boilers fitted with Howden's forced draught, and working at a pressure of 180 lbs. per square inch. The vessel has been built under the superintendence of Mr. H. Barringer, of Messrs. Jacobs and Barringer, London, and Captain Norris, and is the eleventh built for the above firm by Messrs. John Readhead & Sons, Ltd. The vessel proved very satisfactory on her trials, which took place on October 18th.

Bywell.—On August 20th, the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their Shipbuilding and Graving Docks Works the fine steel screw steamer *Bywell*. This steamer is a sister ship to the s.s. *Dilston*, recently built by the Blyth Company, and is the eighth vessel constructed by them to the order of Messrs. Jno. Ridley, Son & Tully, of Newcastle-on-Tyne. The *Bywell*, which measures 255 ft. in length with a beam of 37 ft. 3 in., has been built under special survey for Lloyd's highest class, and is of the raised quarter-deck type, having short bridge and topgallant forecastle. The accommodation for the captain is in the bridge, and for the officers and engineers in sidehouses on raised quarter deck, and the crew are provided for in topgallant forecastle. Specially adapted for the coal and wood trade, having extra large self-trimming hatches and clear holds, the vessel possesses a thoroughly up-to-date equipment of deck machinery for expeditious and economical handling of cargoes. Triple-expansion engines of good power will be supplied by Messrs. North Eastern Marine Engineering Co., Ltd., of Sunderland. During construction the hull and machinery have been under the supervision of Messrs. Jos. R. Scott & Son, of Newcastle-on-Tyne. The trials held on October 1st gave every satisfaction.

Mitcham.—On August 23rd, Messrs. William Dobson and Co. launched from their shipbuilding yard at Walker, a steel twin-screw steamer which they have built to the order of The Wandsworth, Wimbledon and Epsom District Gas Co., for their service between the Tyne and Wandsworth. The principal dimensions are :—Length between perpendiculars 229 ft., breadth 35 ft., depth moulded 15 ft. 10 ins. The vessel has been specially constructed for going under the bridges of the Thames as far as Wandsworth, necessitating lowering funnel, masts, etc., and for the purpose of easy manœuvring twin-screw machinery has been fitted. The main engines have been constructed by Messrs. MacColl & Pollock, Ltd., of Sunderland, and each of these two sets has cylinders 13½ in., 22 in. and 37 in. diameter by 27 in. stroke. There are two main boilers 180 lbs. working pressure. The construction of the steamer has been superintended by Messrs. Robert Eccles & Co., of Newcastle. The trial trip has been recently run, 11 knots being attained.

Nevisbrook.—On August 30th, Messrs. John Blumer & Co., Sunderland, launched the screw steamer *Nevisbrook*, built for Messrs. Miller & Richards, Glasgow. The vessel is of the single-deck type, and will carry about 5,500 tons on a light draught. She has absolutely clear holds, large hatches, and the most up-to-date appliances for rapid discharging. Engines will be fitted by the North-Eastern Marine Engineering Company (Limited), at their Sunderland works. On September 26th the trials were run and proved of a very satisfactory nature.

Petridge.—On August 30th, Messrs. Wood, Skinner & Co., Ltd., Bill Quay, Newcastle-on-Tyne, launched from their shipbuilding yard a handsome new steel screw steamer, which they have built for The Power Steamship Co., Ltd., of London, for their London, Gibraltar and Morocco trade. The principal dimensions of the vessel are :—Length 261 ft., breadth 40 ft., depth moulded 21 ft. 10 in., height of 'tween decks 8 ft. Water ballast is provided in the cellular double bottom throughout and in the fore and after-peak tanks. The vessel has been constructed to the requirements of and under the survey of Lloyd's for their highest classification. She is a splendidly modelled vessel, with a very fine co-efficient, built especially for general cargo trade, with clear holds, well ventilated for carrying perishable cargoes, four large hatchways and double steel derricks to each, also specially fitted derrick for 20-ton lifts, and will be equipped with deck machinery of up-to-date design for the expeditious handling of cargoes and general working, including five powerful steam winches, Brown's telemotor steering gear, steam warping capstan, direct-acting steam windlass, docking telegraph, etc. The vessel has long poop, bridge and extended topgallant forecastle, two decks laid and is fitted with very tasteful cabin accommodation, including large saloon, smoke-room, etc., on bridge deck. The officers and engineers will be accommodated in spacious state-rooms on poop deck and the crew berthed under the topgallant forecastle. With a view to sanitation, the whole of the floors in the state-rooms, saloon, smoke-room, officers' and crew's accommodation, etc., have been covered with "Litosilo" composition, while iron bedsteads are fitted in all berths. The vessel has ample bathroom and lavatory accommodation for ladies and gentlemen, and a special latrine for natives is fitted under the forecastle head. The machinery is of the triple-expansion type constructed by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull, with cylinders 18, 29 and 50 inches diameter by 33 inches stroke, steam being supplied by two extra large boilers with a working pressure of 180 lbs.

per square inch. Both the engines and boilers have also been built to Lloyd's classification, as well as to the German Law requirements. The boilers are placed well above the tank top to prevent corrosion, and Messrs. Wailes, Dove and Co.'s bitumastic enamel is applied to the structure in way of both machinery and boilers, as well as in the bunkers, etc. The vessel and machinery have been superintended during construction by Mr. J. H. French.

Pontoporos.—On August 30th, Messrs. William Doxford and Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Pontoporos*, built to the order of The National Steam Navigation Co., Ltd., of Greece, Athens. The dimensions of the vessel are: Length 399 ft., breadth 52 ft., moulded depth 24 ft. 9 in. Deadweight capacity 7,600 tons. Messrs. Doxford are supplying the engines and boilers and the classification is with the British Corporation. The trial trip was run on the 11th October, a speed of 10¾ knots being attained.

Penmorvah.—On September 1st, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Penmorvah*, which they have built for Richard B. Chellow, Esq., Truro. She will take the highest class in Lloyd's Register, and is of the following dimensions:—Length overall 377 ft., breadth 50 ft. 9 in., and depth 28 ft. 4½ in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers', engineers' and apprentices' rooms, etc., are situated in houses on the bridge deck, and the crew's accommodation, hospital, etc., in the forecastle. The hull is built with deep frames, cellular double bottom, and large aft and fore-peak ballast tanks, eight steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, steam ash hoist, steel grain divisions, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer and Admiralty transport work. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders, 25 in., 41 in. and 68 in. diameter, with a piston stroke of 48 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. John Chellow and Mr. Richard Rapson.

Helmsloch.—On September 2nd, Messrs. Wm. Pickersgill & Sons, Ltd., launched from their yard at Southwick a finely modelled single-decked cargo vessel of over 7,200 tons deadweight, for The Strath Steamship Co., Ltd., Cardiff, being the second vessel the builders have launched for this firm. Messrs. John Dickinson & Sons are supplying the propelling machinery. The dimensions of the vessel are:—Length b.p. 380 ft., breadth 52 ft. 3 in., depth 25 ft. 5½ in. She has been built on the deep bulb-angle frame principle and is of the single-deck type. The trials run on September 27th were very satisfactory.

Flying Breeze.—On September 2nd, there was launched from the Stone Quay shipbuilding yard of Messrs. Jos. T. Eltringham & Co., at South Shields, a very fine passenger tender, which has been built to the order of the Alexandra Towing Company, Ltd., of Liverpool. The overall length of the vessel is about 140 ft., and she is built to Lloyd's highest class and has Board of Trade passenger certificates. Triple-expansion engines of about 1,000 i.h.p. are fitted, steam being supplied by a large three-furnace boiler, built in Messrs. Eltringham's boiler works. The saloons and accommodation throughout are fitted in polished mahogany, and the vessel is lighted with electricity. During construction the vessel has been under the supervision of Mr. R. M. Horsfall, superintendent to the owning firm.

Donax.—On September 2nd, there was launched from the Jarrow yard of Palmer's Shipbuilding and Iron Co., Ltd., the oil-tank steamer *Donax*, which has been built to the order of the Anglo-Saxon Petroleum Company, Ltd., London. The *Donax*, which is about 350 ft. long, with a deadweight carrying capacity of over 5,000 tons on a light draught, is built on the transverse system of framing, and is classed 100 A1 at Lloyd's. The vessel has seven pairs of oil tanks arranged below the main deck, with expansion trunk running the whole length between the main and upper deck and summer tanks at the sides of trunks. The vessel is to be fitted with triple-expansion engines, steam being supplied by two single-ended boilers, arranged to burn oil or coal fuel, the working pressure being 180 lb.

Hambleton Range.—On September 2nd, Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., launched from the Harbour Dockyard, West Hartlepool, the steel screw steamer *Hambleton Range*, built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Neptune Steam Navigation Co., Ltd. The dimensions of the vessel are 362 ft. by 51 ft. ½ in. by 26 ft. 3 in. depth moulded, having a deadweight carrying capacity of about 6,600 tons. She is built to Lloyd's highest class on the shelter-deck principle, having two complete steel decks, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames without side stringers, giving exceptionally clear holds for the stowage of bulky cargoes; wood grain divisions are fitted throughout the holds to Board of Trade requirements and the vessel is divided into seven watertight compartments by six transverse bulkheads. Four large hatches are provided, with nine powerful steam winches worked from a multitubular donkey boiler, and exhausting to a winch condenser, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick-warping steam windlass is fitted forward and steam-steering gear amidships with hand-screw gear aft. Electric light is fitted and long distance wireless telegraphy apparatus is also installed. Accommodation for the captain, officers and engineers is arranged in houses amidships, fitted with steam heating, the crew and firemen being berthed in the forecastle; the lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons" standard triple-expansion engines with cylinders 25 in., 40 in. and 67 in. by 45-in. stroke and two large boilers working under natural draught at a pressure of 180 lbs. per square inch. The condenser is of the Contraflo type, with air pump, temperature regulator, and the engine room auxiliaries include a Cascade Feed Water Heater and Filter, a Morison Evaporator, large ballast donkey and harbour feed pump, etc.

Oldfield Grange.—On September 3rd, Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., launched from the Middleton Shipyard the steel screw steamer *Oldfield Grange*, built to the order of Messrs. Furness, Withy & Co., Ltd., for Messrs. Houlder Brothers & Co., Ltd., London. The dimensions of the vessel are 400 ft. by 52 ft. by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames, without side stringers, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by means of six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting back into a tank in the stokehold and twelve derricks. A powerful quick warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. A large ice house is also fitted for the crew's provisions, etc. The captain, officers and engineers are berthed in large houses amidships, and the crew and firemen in the forecastle. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons" standard triple-expansion engines, having cylinders 26 in., 40 in. and 65 in. by 48 in., with three large boilers working under natural draught at a pressure of 180 lbs. per square inch. The condenser is of the Contraflo type, with temperature regulator, and the engine room auxiliaries include a Cascade feed-water heater and filter, a Morison evaporator, large ballast donkey, and harbour feed pump, etc. The trial trip was run on the 11th of October, 12½ knots being attained. The vessel afterwards proceeded to Narvik.

Macleay, Dane and Clotilde.—On September 3rd, there were launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, two steel screw trawlers, the principal dimensions being 135 ft. by 23 ft. 6 in. by 13 ft. 4 in. moulded, and 130 ft. by 23 ft. by 13 ft. moulded. The first vessel, *Macleay*, has been built to the order of The Neptune Steam Fishing Co., Ltd., of Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. The second vessel, *Dane*, has been built to the order of The "D" Line Steam Fishing Co., Ltd., Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull. The *Clotilde*, another trawler, was launched on September 4th, her principal dimensions being 130 ft. by 23 ft. 6 in. by 13 ft. 6 in. moulded. The vessel has been built to the order of Messrs. J. H. Marr & Son, Ltd., Fleetwood, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd.

Havre.—On September 3rd, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Havre*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.* :—Length overall 331 ft. 6 in., breadth 46 ft. 6 in., and depth 23 ft. 5½ in., with long bridge, poop and topgallant forecastle. The saloon, state-room, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom, and large after-peak ballast tank, six steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in. and 62 in. diameter, with a piston stroke of 42 in. and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. Archibald Walker, on behalf of the owners.

Killdeer.—On September 4th, there was launched at Goole a handsomely modelled steel screw fleeter for Messrs. Kelsall Bros. & Beeching, Ltd., of Hull and London. The vessel, which is 110 ft. long, is constructed to carry about 150 tons of coal, and has two large trimming tanks in the fore hold, capable of holding 40 to 50 tons of water ballast. As she left the ways the vessel was named *Killdeer*.

Charles E. Harwood.—On September 4th, there was launched on the Tyne a steel screw petroleum steamer, which has been built for the Petroleum Carriers, Ltd. The principal dimensions of the vessel are :—Length 330 ft., breadth 45 ft., and depth 26 ft. 6 in. The vessel has been built on the Isherwood system of framing to Lloyd's classification, and is capable of carrying a total deadweight of about 5,000 tons. She is of the two-deck type, with poop, short bridge, and forecastle. The machinery is placed at the after end. The space between the petroleum compartments and the fore peak is arranged as a dry cargo hold. The propelling machinery is of the triple-expansion type, manufactured by the Wallsend Slipway and Engineering Company, Ltd., having cylinders 19 in., 31½ in. and 50 in. by 36 in. stroke, steam being supplied by two boilers 12 ft. by 11 ft. 6 in. The boilers are arranged for oil burning. The trials have been run and proved very satisfactory.

Hitchin.—On Septemper 4th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son., Ltd., Wear Dock Yard, the steel steam collier *Hitchin*, of 2,750 tons deadweight capacity, which has been built to the order of Messrs. Wm. Cory & Son, Ltd., of London, and is the twenty-eighth vessel constructed for the same owners. She will be classed Lloyd's 100 A1, under special survey. Large self-trimming hatchways and large water ballast capacity are provided. Accommodation for captain and officers is fitted in the bridge, engineers in after end of bridge, and crew in forecastle. The machinery will be supplied by the North Eastern Marine Engineering Co., Ltd., Sunderland. The construction of the vessel has been superintended by Mr. Arthur Valder, Mem. Inst. N.A., on behalf of the owners. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" Enamels have been applied in the bunkers and their patent "Bitumastic" covering to the tank top in boiler room.

Shahristan.—On September 15th, Messrs. William Gray and Company, Ltd., launched the handsome steel screw steamer *Shahristan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's Register, and is of the following dimensions, viz. :—Length overall 392 ft., breadth 51 ft. 6 in., and depth 30 ft. She is a handsomely modelled vessel with two decks laid and poop, long bridge and top-gallant forecastle, having very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and the crew's berths in the forecastle. An electric light installation is fitted throughout. A cellular double bottom and after-peak tank and in addition a deep tank or hold compartment are fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,000 tons. The whole of the outfit, including sanitary tanks, fresh-water distiller, steam windlass, steam-steering gear, two derricks to lift thirty tons each, twelve steam winches with return exhaust to winch condenser of the Contraflo type, are of the most approved description. The machinery is made by The Central Marine Engine Works of the builders, being of the triple-expansion type with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a complete outfit of auxiliaries, including duplex ballast pumps, evaporator, etc., all of the "Cmew" special type, Contraflo main condenser, Weir's feed pumps and heater, and three large steel boilers, working by Howdon's system of forced draught at a pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. Archibald Walker, on behalf of the owners.

Ellerdale.—On September 16th, Messrs. Robert Thompson and Sons, Ltd., successfully launched from their Southwick Yard a first-class finely modelled cargo steamer, built to the order of Messrs. Thos. Smailes & Son's Steamship Co., Ltd., of Whitby, and the fifth vessel they have built for the same owners. Her principal dimensions are :—Length overall 361 ft. 4 in., breadth 50 ft., and depth moulded 25 ft. 10 in. She will take the highest class at Lloyd's, is constructed with single deck, and designed to carry a large deadweight cargo on a light draught, and throughout fitted with the most modern improvements. Ample water ballast is provided in the cellular bottom and after peak. Full cargo poop and bridge are fitted, and topgallant forecastle, where the crew will be comfortably berthed. Spacious accommodation is provided for the officers, etc., and the dining saloon, tastefully fitted up in oak, is in a large steel house at the fore end of the bridge, with captain's sitting and sleeping rooms above, and the engineers' and petty officers' berths are situate in steel houses abreast the engine casing. There are five cargo hatchways, each with double derricks fitted on tables with crosstrees at mastheads, also steel derrick posts to bridge hatches, all worked by six powerful steam winches with extended drums, and large multitubular donkey boiler of ample capacity. The engines are by the North Eastern Marine Engineering Co., Ltd., Sunderland, having cylinders 25 in., 42 in. and 68 in., with a stroke of 45 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch. During construction the vessel and her machinery have been under the personal supervision of Messrs. N. T. & F. G. Daniel, of Cardiff.

Harbury.—On September 16th, the *Harbury*, built to the order of Messrs. J. & C. Harrison, Ltd., London, was launched from the yard of the Sunderland Shipbuilding Co., Ltd. Her leading dimensions are :—Length, 400 ft. ; breadth, 53 ft., and depth, moulded, 28 ft. 6 in. She is a complete shelter deck ship and has been built under Lloyd's to take their 100 A1 class. Ample provision is made for water ballast in cellular double bottom and both peaks. Special facilities are provided for the rapid handling of cargo. The deck machinery consists of ten steam winches, steam-steering gear fitted up in after end of engine and direct steam windlass, the whole being worked by a large horizontal donkey boiler. Wood shifting boards have been fitted throughout. Accommodation is provided on top of shelter deck amidships for twelve passengers, together with captain, officers and engineers, whilst a commodious saloon is tastefully fitted up in polished hardwoods. The crew and petty officers are situated under shelter deck forward. A complete installation of

electric light is fitted throughout the vessel, and the accommodation is provided with steam heating and an efficient sanitary service. The main engines and boilers are by Messrs. Blair & Co., Ltd., Stockton-on-Tees. During construction the hull and engines have been under the supervision of Mr. White and Mr. Crandell and Mr. Short, the owners' superintendent.

Figulina.—On September 17th, Messrs. Osbourne, Graham and Co. launched from their yard at Hylton, the steel screw steamer *Figulina*, which they have specially constructed to the order of A. Anpest, Esq., Paris. The vessel, whose principal dimensions are—length, 220 ft.; breadth, 32 ft. 6 in.; depth moulded, 17 ft. 6 in., is of the raised quarter-deck type with forecastle for crew. Accommodation is fitted amidships for captain and officers. Arrangements are made for a large amount of water ballast, and the specifications are very complete and include French law requirements. Engines powerful enough to drive the vessel loaded a speed of 10 knots will be supplied by Mr. George T. Grey, of South Shields.

Seapool.—On September 17th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*: Length, 392 ft. 6 in.; breadth, 56 ft.; depth, 26 ft. 9 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, long bridge and topgallant forecastle, and accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle, and in fore and after peaks. She will be fully equipped with an up-to-date outfit including quick-warping windlass, stockless anchors, steam-steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, and double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,450 i.h.p., having three steel boilers 14 ft. 9 in. by 11 ft., 180 lbs pressure of steam.

Cedartree.—On September 29th, there was launched at Sunderland, a steel screw steamer, built to the order of Messrs. Howard-Jones & King, of Cardiff. The vessel is designed with self-trimming hatches to carry a deadweight of about 2,500 tons on a light draught of water. Engines will be fitted by the North-Eastern Marine Engineering Co., Ltd., of Sunderland.

San Urbano.—On September 30th, there was launched at Walker the large screw petroleum steamer *San Urbano*, built to the order of the Eagle Oil Transport Co., Ltd., of London. The chief dimensions of the vessel are:—Length overall, 432 ft.; breadth extreme, 54 ft. 6 in.; depth moulded, 32 ft. 8½ in. The vessel, which is capable of carrying a total deadweight of 9,400 tons on a moderate draught of water, has been built on the Isherwood system to Lloyd's highest class under special survey. For dealing with the cargo there is a large installation of pumps and oil piping throughout the vessel, and a system of heating coils in the oil compartments. The propelling machinery is of the quadruple-expansion type, manufactured by the Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne, and will be placed in the after end of the vessel. The cylinders are 24 in., 35 in., 50½ in. and 73 in. by 51 in. stroke, steam being supplied from three cylindrical multitubular boilers, with a working pressure of 220 lbs.

Orlock Head.—On September 30th, Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., launched from their harbour yard at West Hartlepool the steel screw steamer *Orlock Head* for account of the Ulster Steamship Co., Ltd. (Messrs. G. Heyn & Sons, Belfast, managers). The vessel will be of the highest class of the British Corporation Register, and complies with Board of Trade requirements for a first-class cargo steamer to carry about 3,300 tons deadweight, and is of the following dimensions:—Length b.p., 295 ft.; breadth, 40 ft. 2 in.; depth, 29 ft. 6 in., and about 2,000 tons gross register. The *Orlock Head* has been specially built for the Baltic trade of the Company from Russian ports to and from Belfast and Dublin, is schooner rigged with two masts, has long bridge house amidships, also forecastle and poop. Accommodation for captain, officers and engineers and a few passengers is arranged in steel houses above the bridge deck, with chart house, flying bridge and wheel house on top. The outfit for working cargo is very complete, including double derricks throughout, special steam winches, steam windlass and warping arrangements, also steam-steering gear, electric light and all modern improvements. The machinery and boilers have been constructed by Messrs. Richardsons Westgarth & Co., Hartlepool. The engines are triple-expansion, with two large single-ended boilers working at a pressure of 180 lbs., with very full specification of auxiliary plant, fully up-to-date, embodying the full "contraflo" system of the makers, and is fitted with bronze propeller blades. The hull and machinery have been constructed under the supervision of Mr. Hugh Wisnom, M.I.N.A., the Company's superintendent. The *Orlock Head* is the third steamer built by Messrs. Irvine for the same owners, and when ready for sea she will take her place on the company's line from Riga to Belfast. The *Orlock Head* will be commanded by Capt. T. Wilson, late of the s.s. *Teelin Head*, who has had very long experience in the Baltic service of the Company.

Mansa Kila Ba.—On September 30th, there was successfully launched from the yard of Messrs. Rennie-Forrestt at Wivenhoe, Essex, the motor yacht *Mansa Kila Ba*, which has been constructed to the order of the crown agents for the colonies for service in Gambia, under the superintendence of their consulting naval architects, Messrs. Flannery, Baggallay and Johnson, Ltd., of London, Liverpool and Rotterdam. Her principal dimensions are 110 ft. long by 12 ft. 3 in. beam and 7 ft. 9 in. moulded depth, with a draught of about 5ft., fully equipped with fuel tanks and fresh-water tanks full, and one hundred passengers on board. The vessel will be propelled by triple-screw marine type motors by Messrs. J. I. Thornycroft & Co., capable of driving the vessel at eleven knots per hour. The yacht has four water-tight bulkheads with the motor machinery amidships and the storerooms, native petty officers' accommodation, hold and native crew space below main deck. Passenger and officers' accommodation is arranged on main deck, and the suite of accommodation for the Governor is in the forward part of the deck house. Electric light is fitted throughout. Recent investigation has conclusively proved that all tropical disease is communicated by mosquitoes and other winged insects, and the vessel has arrangements especially provided to make her mosquito-proof throughout, including a large gauze wire saloon on the promenade deck with air lock for access and egress. The yacht has special provisions in her arrangements for use as a transport for a small number of troops from one part of the colony to another.

Penistone.—On October 1st, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby shipbuilding yard, Stockton-on-Tees, a fine and handsomely modelled single-deck screw steamer of the following dimensions, *viz.*, 382 ft. by 51 ft. 4½ in. by 26 ft. 6 in. moulded; she is built of steel to the highest class in Lloyd's registry, under special survey, and has several important additions to the owners' special requirements. She has poop, long bridge and forecastle combined; very large water ballast capacity in double bottom fore and aft and in peaks; she is fully equipped with all the latest and best types of special machinery for the general equipment usual for this class of steamer, and for rapid loading and discharging. The steamer is specially adapted for the Eastern, Gulf, Plate and general trades, and has very large cubic capacity. She is fitted throughout with shifting boards, etc., for the carriage of grain cargoes. Special attention has been given to the accommodation for the master, officers, and crew, who are all provided with very superior rooms and comfortable quarters, the master, officers and engineers being on bridge deck amidships, and the crew in the poop. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton-on-Tees, the cylinders being 26 in., 42½ in., 69½ in. by 45 in., with two large steel boilers working at 180 lbs. pressure, an additional boiler being supplied for cargo and general purposes by Messrs. Riley Brothers, Ltd., Stockton. The vessel has been built to the order of Messrs. Charles Radcliffe & Co., Cardiff, and is a duplicate of the s.s. *Atherstone*, recently delivered to the same owners by Messrs. Craig, Taylor & Co., Ltd. The steamer has been built under the superintendence of Mr. Charles Jones, consulting engineer of Cardiff, assisted by Mr. J. W. Henry and Mr. W. T. James.

Helgian, Lord Londesborough and T. R. Ferens.—On Oct. 1st, there was launched from the yard of Messrs. Cochrane and Sons, Ltd., shipbuilders, Selby, the steel screw trawler *Helgian*, the principal dimensions being 120 ft. b.p. by 21 ft. 6 in. by 12 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Great Central Co-operative Engineering and Ship Repairing Co., Ltd., Grimsby, who will also supply the engines, which are to be of the triple-expansion type. On October 2nd, there were also launched two steel screw trawlers, *Lord Londesborough* and *T. R. Ferens*, from the same yard, the dimensions in each case being 136 ft. 8 in. b.p. by 23 ft. 3 in. by 13 ft. moulded. They have been built to the order of Messrs. The Yorkshire Steam Fishing Co., Ltd., and Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., of Hull, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull.

Anglo-Brazilian.—On October 2nd, the s.s. *Anglo-Brazilian* was successfully launched from the shipyard of Messrs. Short Brothers, Ltd., of Pallion, Sunderland. She is built to the order of the Nitrate Producers Steamship Co., Ltd., of London (Messrs. Lawther Latta Co., managers), with leading dimensions of 442 ft. length, 56 ft. beam, and 30 ft. 7½ in. depth moulded. The vessel is built on the Isherwood system of longitudinal framing, with shelter, upper and main decks of steel laid the entire length, and upper bridge 14 ft. above shelter deck, and will take Lloyd's highest class. A double bottom has been fitted throughout for the carriage of oil fuel or water ballast, and the fore and after peaks are also arranged for water ballast. The holds and 'tween decks are divided by seven water-tight bulkheads. The shelter deck has been fitted with four large doors through sides, so that the steamer may be readily adapted for the conveyance of horses or cattle. A dining saloon, neatly panelled in oak, is fitted in the fore end of bridge, with four state-rooms for passengers, steel houses, with rooms for captain, chart-room, office and library, and another spare berth is built on top of bridge deck with officers' day-room and wheelhouse above. The officers and engineers are berthed in a steel house abreast of engine casing in bridge, and the crew and petty officers in the after end of shelter deck. The accommodation throughout has been specially designed to give the greatest possible comfort to officers and crew. Smoking-room and mess-room are provided for officers and engineers and a very complete sanitary service is installed, including baths for crew, officers, engineers and for the captain and passengers. Electric light is arranged throughout accommodation in engine-room and tunnel, with large clusters over each hatchway. The cargo arrangements are very complete, sixteen derricks being fitted on tables at masts and in addition an arrangement of Porter's patent derrick gear to lift 20 tons will be available at each mast, the masts being strengthened to carry this weight. Two derricks to work the cross bunker hatch are placed on strengthened posts. Ten steam winches, two with extended ends and the after winch fitted with gipsy wheel, clutch and brake for steam cable, steam windlass, steam-steering gear of Wilson-Pirrie type, in house on after end of shelter deck, controlled by telemoter from wheelhouse. Crompton's self-tipping ash hoist, with sheet over side, and fresh water distiller will be supplied, taking steam from a multitubular boiler of 120 lbs. pressure placed in stokehold and exhausting to a "Contraflo" winch condenser in discharge recess. Hand-steering gear with two wheels and Jackson's patent rudder brake are also fitted. Clayton's fire extinguishing system is installed to all compartments. The propelling machinery will be fitted by Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend, consisting of quadruple engines with cylinders 25 in., 36½ in., 52½ in. and 76 in. diameter, and a stroke of 54 in., driven from three large boilers of 220 lbs. pressure with Howden's forced draught. The machinery has been designed throughout with a view to economical working, being considerably strengthened above the usual practice with extra large bearing surfaces at all working parts. The main condenser is of the Contraflo type (Morrison's patent). During construction the hull and machinery have been under the supervision of R. J. Quelch, Esq., of London.

Teano.—On October 2nd, there was launched from the yard of Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, a finely modelled steel screw steamer. The vessel, which is named *Teano*, is built to the order of Messrs. Thos. Wilson, Sons & Co., Ltd., and is intended for the Mediterranean and Baltic trades. The length of the vessel is 300 ft., breadth moulded 44 ft. 6 in., depth moulded 20 ft. She has been constructed of steel throughout to the British Corporation highest class, and to the latest Board of Trade requirements. The vessel is of the shelter deck type, with saloon deck house amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has two steel pole masts, and very efficient appliances for the speedy handling of cargo, the derricks, ten in number, being capable of dealing with heavy lifts. The derricks will be worked by powerful steam lifts. The derricks will be worked by powerful steam winches of the most up-to-date description, and a latest improved steam windlass by Messrs. Emerson, Walker & Thompson is also fitted. The steering engine is placed in the deck house aft, and is controlled by the telemotor system from the navigating bridge. Powerful hand-screw gear is also combined with the steam steering engine, both of which have been supplied by Messrs. Amos & Smith, Hull. The work throughout the vessel is of the very best description, with all the latest improvements. Triple-expansion engines are provided by the builders, steam being supplied by two large boilers designed to drive the vessel at a good speed on a minimum coal consumption.

Imperial Transport.—On October 3rd, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard the steel screw steamer *Imperial Transport*, built to the order of Messrs. Furness, Withy & Co., Ltd., for The Empire Transport Co., Ltd. (Messrs. Houlder Brothers and Co., Ltd., managers), London. The dimensions of the vessel are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames without side stringers, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven water-tight compartments by means of six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting back into a tank in the engine room, and twelve derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. A large ice house is also fitted for the crew's provisions, etc. The captain, officers and engineers are berthed in large houses amidships and the crew and firemen in the forecastle. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of Richardsons' standard triple-expansion engines having cylinders 25 in., 40 in. and 68 in. by 48 in., with three large boilers working under natural draught at a pressure of 180 lbs. per square in. The condenser is of the Contraflo type, with temperature regulator, and the engine-room auxiliaries include a cascade feed water heater and filter, a Morrison evaporator, large ballast donkey and harbour feed pump, etc.

Bronwen.—On October 14th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Dock, South Shields, a steel screw steamer built to the order of Messrs. The W. & C. T. Jones Steamship Co., Ltd., Cardiff. The vessel, which is 375 ft. by 51 ft. by 28 ft. 9 in., is of the improved single-deck type, with a deadweight capacity of 7,500 tons, with poop, long bridge and topgallant forecastle, and large holds clear of beams, double bottom all fore and aft for water ballast, and water ballast also carried in fore and after peaks. She is fitted throughout for grain cargoes with steel centre line division bulkhead and feeders, large hatchways, powerful steam winches driven from a large donkey boiler of multitubular marine type and double derricks for loading and discharging cargoes, the derricks being swung from tables and crosstrees on the masts. The captain and officers are accommodated in large deck houses amidships, the engineers in separate houses abreast of engine casing, and the crew in topgallant forecastle. She is built to Lloyd's highest class under their supervision, and also under the personal supervision of Mr. George Wilson,

the owners' superintendent and consulting engineer. The vessel also conforms to the latest requirements of the Board of Trade. She will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 43 in. and 71 in., with 48 in. stroke, supplied with steam from three large steel boilers working at a pressure of 180 lbs. per square in. This is the twelfth vessel built for the above firm by Messrs. John Readhead and Sons, Ltd.

Eburna.—On October 14th, Messrs. Swan, Hunter and Wigham Richardson, Ltd., launched from their Wallsend yard the sixth ship that they have built in recent years for the Anglo-Saxon Petroleum Company, of London. The vessel is the *Eburna*, a steel two-deck tank steamer, 392 ft. long, with a breadth of 52 ft. 9 in., and designed to carry over 7,000 tons on a moderate draught. The *Eburna* has been built on the Isherwood system of longitudinal framing. The engines, of triple-expansion type, and also the boilers, are being built by the Wallsend Slipway and Engineering Company, Ltd., and will be placed in the after end of the vessel. The various holds for carrying oil are separated by transverse and longitudinal oil-tight bulkheads. Amidships is a pump-room, and at each end of the range of oil holds is a cofferdam. Arrangements will be made for steaming out the oil tanks, and also for installing steam-heating coils in each oil hold to thin heavy oils that may be carried. The small steam and motor launches of the shipyard and engine works easily berthed the *Eburna* alongside the Wallsend shipyard directly after she had become water-borne.

Oceanos.—On October 15th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Oceanos*, which they have built for Messrs. A. A. Embiricos & Co., London. The vessel is of the shelter-deck type, and will take the highest class in the British Corporation register. Her dimensions are :—Length overall, 415 ft. 6 in. ; breadth, 54 ft., and depth, 27 ft. 6 in. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the shelter deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft and fore-peak ballast tanks, seven steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 26 in., 42 in. and 70 in. diameter with a piston stroke of 48 in. and three large steel boilers for a working pressure of 180 lbs. per square in.

Offa.—On October 16th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being 135 ft. by 23 ft. 6 in. by 13 ft. 6 in. moulded. The vessel has been built to the order of Mr. A. Bannister, of Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull.

Nigaristan.—On October 16th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Nigaristan*, which they have built for Messrs. Frank C. Strick and Co., Ltd., of Swansea and London. She will take the highest class in Lloyd's register, and is of the following dimensions : Length overall, 377 ft. ; breadth, 50 ft. 9 in., and depth, 28 ft. 4½ in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers', engineers', apprentices' rooms, hospital, etc., are situated in houses on the bridge deck and the crew's accommodation in the forecastle. The hull is built with deep frames, cellular double bottom and large aft-peak ballast tank, ten steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25 in., 41 in. and 68 in. diameter, with a piston stroke of 48 in. and two large steel boilers for a working pressure of 180 lbs. per square in. The ship and machinery have been built under the superintendence of Mr. Archibald Walker on behalf of the owners.

Jeannine.—On October 16th, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton, the steel screw steamer *Jeannine*, which is the second of several vessels they are specially constructing to the order of A. Aupest, Esq., of Paris. The vessel, whose principal dimensions are—length 220 ft., breadth 32 ft. 6 in., depth moulded 17 ft. 6 in., is of the raised quarter-deck type with forecastle for crew. Accommodation is fitted amidships for the captain and officers. Arrangements are made for a large amount of water ballast, and the specifications are very complete and include French law requirements. Engines powerful enough to drive the vessel loaded a speed of 10 knots will be supplied by Mr. George T. Grey, of South Shields.

Tuscan Prince.—On October 16th, a great deal of interest was manifested in the launch of the *Tuscan Prince* at the yard of Messrs. W. Doxford & Sons, Pallion, this vessel being the fiftieth built on the Wear for the Prince Line, Ltd., in a period of thirty-five years. The *Tuscan Prince* has been built to Lloyd's classification. Her length is 434 ft., breadth 54 ft., moulded depth 29 ft., and her deadweight 9,000 tons. The engines and boilers are also by Messrs. W. Doxford and Sons. Sir Theodore Doxford, in proposing "Success to the *Tuscan Prince*," said he was under the impression that the *Tuscan Prince* was the largest vessel ever launched for the Prince Line in Sunderland, but he found that she was only the second best. Her deadweight was a little over 9,000 tons and she would steam 11 or 12 knots. The Prince Line had given many orders to Sunderland and he believed that without exception they had been successful. He hoped the *Tuscan Prince* would be even more successful than the other Prince Liners built at Sunderland.

Bestwood.—On October 17th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son., Ltd., Wear Dock Yard, Sunderland, the steel steam collier *Bestwood*, of about 3,250 tons deadweight capacity, built to the order of Messrs. Wm. France, Fenwick and Co., Ltd., of London and Sunderland. The vessel has been constructed under Lloyd's special survey for 100 A1 class, and has large hatchways specially adapted for the owners' coal trade ; large water ballast capacity, etc. The accommodation for the captain, officers and engineers is fitted in the bridge and for the crew in the forecastle. The machinery will be supplied by the North Eastern Marine Engineering Co., Ltd., Sunderland. The vessel has been superintended during construction by Messrs. Thompson, Eyres & Bryers, of Sunderland, on behalf of the owners.

LAUNCHES—Scotch.

Maryland.—On September 4th, this vessel, built to the order of the Atlantic Transport Line, was successfully launched at the Govan Shipbuilding Yard, Glasgow. The *Maryland* is 353 ft. 9 in. in length overall and 50 ft. 4 in. extreme beam, with a gross tonnage of about 5,000. The new vessel, which has been built to the survey of the Board of Trade, has a double bottom constructed on the cellular principle, and the water-tight bulkheads extend to the upper deck. There are five steel decks and the scantlings are in accordance with the builders' usual practice, so that the structure is a very strong one. The *Maryland* is intended to carry a large cargo and is provided with the latest and most approved facilities for working ship and cargo. The derrick tables on each mast are arranged to take six derricks each, for working Nos. 1 and 2 hatches forward, and 4 and 5 hatches aft. There are two derrick posts forward, one on the port side and one on the starboard side, with two derricks on each for working Nos. 2 and 3 hatches, making sixteen derricks in all, each lifting 5 tons. There are four 7 in. by 12 in. double purchase winches arranged between Nos. 1 and 2 hatches, and four between Nos. 4 and 5 hatches ; also two double purchase winches 7 in. by 18 in. arranged one at each derrick post forward. The warping winch is 8 in. by 14 in. double purchase, placed on the shelter deck aft, and the steam windlass is arranged on this deck forward for working cables $2\frac{3}{16}$ in. diameter. The steering gear is of the Harland and Wolff's type, cylinders 6 in. by 8 in. by 8 in., quadrant 5 ft. 9 in. radius. The steering engine is situated in a steel house aft on upper deck and controlled by a telemotor from the navigating bridge. There is good accommodation for the captain, officers and crew, and a complete installation of electric light ; also wireless telegraphy and submarine

signalling apparatus. The *Maryland* was towed to Belfast immediately after the launch to receive her machinery, which is being constructed in Messrs. Harland & Wolff's engine works there, where the vessel will be completed ready for sea. During construction the vessel has been under the supervision of Captain Tubb, marine superintendent, and Mr. B. P. Fielden, superintendent engineer of the Atlantic Transport Line.

Paladin.—On September 4th, there was launched from the shipyard of Messrs. Murdoch & Murray, Ltd., Port Glasgow, the steel screw steamer *Paladin*, built to the order of the Anchor Line (Henderson Bros.), Ltd., Glasgow, and which will be used as a tender in connection with their large ocean-going liners, the vessel being designed to carry over 700 passengers and having life-saving appliances in accordauce with the latest Board of Trade regulations. The vessel, which has been built under British Corporation survey, is 140 ft. by 30 ft. by 12 ft. 9 in. moulded. Twin-screw machinery will be supplied by Messrs. Ross & Duncan, Glasgow, to give a speed of 13½ knots.

Strabo.—On September 15th, Messrs. Archibald McMillan and Son, Ltd., Dumbarton, launched the steamer *Strabo*, which they have built for Messrs. Lamport & Holt, Ltd., Liverpool. The vessel, which is the third Messrs. McMillan have built for this firm, is of the following dimensions :—Length between perpendiculars 400 ft., breadth 52 ft. and depth 30 ft. The machinery is being supplied by Messrs. David Rowan & Co., Glasgow. During construction the vessel has been under the supervision of Captain Bird, Mr. Dell aud Mr. Weaver, the owners' representatives. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the coal pockets, double bottom, ballast tanks, and their patent "Bitumastic" covering to the tank tops.

Emperor Nicholas I.—On September 20th, there was launched at Clydebank the twin-screw steamer *Emperor Nicholas I.*, built to the order of the Russian Steam Navigation and Trading Company, Odessa. The vessel is the third of four similar ships which are at present under construction on the Clyde for the same owners—two at Clydebank and two at Dumbarton. They are intended to develop the trade between the Black Sea ports and Alexandria, and have been constructed to the highest requirements of Lloyd's. Their principal dimensions are : Length between perpendiculars 380 ft., breadth 51 ft. 6 in., depth to shade deck 38 ft. 6 in., and gross tonnage 5,750 tons. The *Emperor Nicholas I.* will have accommodation for 82 first, 54 second, and 300 third-class passengers. She will be propelled by twin-screw direct-acting, surface-condensing triple-expansion engines, having six cylinders—two high pressure, two intermediate, and two low pressure, of 22, 36 and 58 in. diameter respectively and 4 ft. stroke. Steam will be generated by four single-ended boilers working at a pressure of 180 lb. The construction of the vessel has been carried out under the superintendence of Captain M. Heyman, and the machinery is being superintended by Mr. Th. Lichkovacho.

Kingfisher.—On September 24th, Messrs. George Brown and Co., Greenock, launched a small steamer named *Kingfisher*, for the General Steam Navigation Company, London. The vessel is of 300 tons gross, 140 ft. in length, 24 ft. in breadth, and 11 ft. in depth. She is intended for the London, Yarmouth and Lowestoft general cargo trade. Machinery to give a loaded speed of 11 knots will be supplied by Messrs. M'Kie & Baxter, Govan.

British Monarch.—On September 27th, there was launched by Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *British Monarch*, which they have built to the order of the Monarch Steamship Co., Ltd. (Messrs. Raeburn and Verel, Ltd., managers). The vessel has been built to the highest class under the British Corporation Rules. The principal dimensions are :—Length b.p. 420 ft., breadth moulded 54 ft., depth moulded 31 ft. 6 in., with a gross tonnage of about 6,000 and carrying capacity of fully 9,300 tons. She has complete upper and main decks, with long bridge, poop and topgallant forecastle, water ballast in cellular double bottom, aft peak and large deep tank abaft engine-room. The 'tween decks of the vessel are exceptionally high and fitted with lights throughout, making her suitable for the carriage of troops or emigrants. The vessel has a most complete and convenient arrangement of hatches, derricks (including one for 20 tons lift) and 10 steam winches for the rapid handling of cargo; electric light consisting of a very powerful installation of arc lamps is fitted throughout. The machinery, which is being supplied by Messrs. D. Rowan and Co., Glasgow, consists of triple-expansion engines with cylinders 27 in., 44 in. and 73 in. respectively by 48 in. stroke. There are two boilers of large size fitted with Howden's forced draught, also donkey boiler. The hull and machinery have been constructed under the direction of Mr. J. Cameron Black, superintendent of Messrs. Raeburn and Verel, Ltd., and his assistant, Mr. Alfred Raeburn.

Dredger "No. 2."—On September 29th, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched complete and ready for work the powerful twin-screw bow-well barge loading bucket Dredger "No. 2," the sixth of eight dredging vessels which they have under construction to the order of the Russian Government. The vessel has been built under the survey of Bureau Veritas for classification in their register, and under the inspection of Captain M. A. Schmidt, I.R.N. The dredger is fitted with two sets of compound surface-condensing engines, each driving its own propeller. Steam is supplied by two steel multitubular boilers, constructed to Lloyd's requirements for 120 lbs. working pressure. The engines are arranged to give two speeds of buckets, so that either set is available for driving the dredging gear. The bucket ladder is designed for dredging the vessel's own flotation and to a depth of 40 feet below water level. The bucket dredging capacity is 1,000 tons per hour. The vessel is lighted throughout with electric light and the cabins are all steam-heated.

Strathella and Strathclova.—On September 29th, Messrs. Hall, Russell & Co., Aberdeen, launched two steam trawlers for the Aberdeen Steam Trawling and Fishing Company. The dimensions of the vessels are :—Length 115 ft., breadth 22 ft., and depth 13 ft. Triple-expansion engines will be supplied by the builders.

William H. Raeburn.—On September 30th, Messrs. Ferguson Brothers, Port Glasgow, launched the self-propelling bucket ladder dredger *William H. Raeburn*, which they have built for the Clyde Lighthouses Trustees. The vessel which is of the bow-well, centre bucket ladder type, is 150 ft. in length, 34 ft. in breadth, and 12 ft. in depth. She has been built to Lloyd's highest class. The bucket ladder and box framings for supporting the chain of buckets and dredging gear have been constructed of the best class of girder work. Side shoots are arranged for discharging the dredged material over either side of the vessel into hopper barges. the lifting and lowering of each shoot being worked by an independent engine. The regulation of the spoil to either side of the vessel is controlled by a strong flat valve door fixed at the apex of shoots, and worked by gear from the main deck. The bucket ladder is snspended independently of the upper tumbler shaft. The main engines, which are employed for either propelling the vessel or driving the dredging gear, consist of one set of the compound-expansion, surface-condensing, inverted, direct-acting type. Steam is supplied by two cylindrical return, multitubular boilers, constructed under Lloyd's special survey. The dredging machinery is of massive design. Two sets of buckets are supplied, one for soft and one for hard material. The gearing is arranged to work the buckets at two different speeds, according to the nature of material which is being dredged. The upper tumbler shaft is driven by two friction spur wheels of large diameter, capable of being adjusted to convey the necessary power to the buckets according to the hardness of the material. The hoisting-gear for the bucket ladder consists of a heavy wire rope tackle working in upper and lower sheave blocks suspended from a crosshead fixed on a box-framing structure built into the vessel at the forward end. The lower sheave blocks are connected to the bucket ladder by strong forged side rods, and the wire rope is wound on a large grooved barrel driven by gearing from a double-cylinder engine, all placed under deck. Each bucket has a capacity of 21 cubic feet. The dredger is capable of propelling herself at a speed of about 7 knots.

Ferencz Joszef Kiraly.—On October 1st, the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, launched a steel screw steamer for the Royal Hungarian Sea Navigation Co., "Adria" Ltd., Fiume. The vessel was named *Ferencz Jószef Király*. Immediately after the launch the vessel was placed in the Company's dock to receive her machinery, which has also been constructed by the builders.

The engine and boiler casings are being covered with Messrs. Matthew Keenan & Co's patent compositions.

Nortonian.—On October 1st, there was launched from the shipbuilding yard of Messrs. David and William Henderson and Co., Ltd., at Partick, Glasgow, the large steel screw steamer *Nortonian*, of about 6,350 tons gross, which they have built to the order of Messrs. Frederick Leyland & Co., Ltd., Liverpool. This addition to the already large fleet of vessels owned by Messrs. Leyland is 400 feet long between perpendiculars by 52 ft. 2 in. broad by 30 ft. 7 in. depth moulded, is classed in Lloyd's 100 A1, and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner and has an exceptionally large number of powerful derricks which, with eight steam winches provide ample means for the rapid handling of large cargoes. Comfortable accommodation is provided on shelter deck amidships for passengers, also for officers, engineers, etc., while the petty officers and crew are berthed in houses on the shelter deck. The machinery which has been constructed by the builders consists of quadruple-expansion engines having cylinders 23½ in., 34 in., 49 in. and 70 in. diameter by 51 in. stroke, with steam from three boilers at 215 lbs. pressure. The vessel and machinery have been constructed under the supervision of the owners' superintendents, Captain Fry and Mr. Wm. Scott, assisted by Mr. McClements.

J. Oswald Boyd.—On October 1st, Messrs. Bow, M'Lachlan and Co., Paisley, launched the 2,000-ton twin-screw steamer *J. Oswald Boyd*, which they have built for the Petroleum Carriers Company, Ltd., Glasgow. The new steamer has been specially constructed for carrying oil in bulk, and has a capacity for about 3,000 tons in tanks amidships. The machinery, which is to be supplied by the builders, will be placed close aft. The vessel has been built to Lloyd's highest class under special survey, and she is fitted with all latest auxiliaries and equipment. A powerful pumping installation has been provided for loading and discharging the oil cargo.

Sif.—On October 1st, the Dundee Shipbuilding Company launched a steamer of 1,300 tons gross which they have built for the Redeviaktiebolag Svea Company, Stockholm. The vessel will be supplied with engines on the Tyne. Her dimensions are: Length over all 244 ft., breadth 36 ft., and depth 17 ft. 3 in.

Moorfoot.—On October 2nd, the Greenock and Grangemouth Dockyard Company, Grangemouth, launched the steamer *Moorfoot*, which they have built to the order of Messrs. George Gibson & Co., Leith, for their Leith and Continental trade. The dimensions of the vessel are:—Length 282 ft., breadth 43 ft., and depth 19 ft. 6 in. moulded. She is designed to carry 3,000 tons on a draught of 18 ft. Machinery designed to give a loaded speed of 11 knots will be supplied by Messrs. J. G. Kincaid & Co., Greenock.

Helenus.—On October 3rd, Messrs. Scott's Shipbuilding and Engineering Company, Greenock, launched the single-screw steamer *Helenus*, which they have built to the order of the Holt Line, Liverpool. The vessel is of 7,000 tons gross, and her principal dimensions are:—Length 452 ft., breadth 56 ft., and depth 35 ft. 3 in. Triple-expansion engines will be supplied by the builders. The *Helenus* is intended for the Eastern trade.

Cabo Corrientes.—On October 6th, there was launched at Pointhouse a steel paddle steamer which has been built to the order of the Hamburg-South American Steamship Company for service on the River Plate. The vessel is intended to carry passengers and cargo between Montevideo and Buenos Ayres, and has accommodation for 238 first-class and 180 third-class passengers. Her principal dimensions are:—Length, keel to forerake, 320 ft.; breadth over sponsons, about 72 ft.; and depth to promenade deck, 29 ft. A large dining saloon and music or smoking room are provided for the use of first-class passengers, and the state-rooms are large and airy.

City of Corinth.—On October 14th, Messrs. Barclay, Curle and Co., Whiteinch, launched the steel screw steamer *City of Corinth*, the latest addition to the extensive fleet owned by the Ellerman Line, Ltd. The vessel, which is built to the highest class of the British Corporation Registry, is of the following dimensions:— Length 430 ft., 6 in., breadth 55 ft. 3 in., and depth 32 ft. 1 in. She is of 6,300 tons gross, and is a thoroughly up-to-date cargo carrier, with a deadweight carrying capacity of about 10,000 tons. The outfit of winches and other deck machinery is unusually complete and is designed with a view of rapid and economical handling of cargo. An installation of wireless telegraphy will also be fitted, while a feature of the vessel is the cruiser stern, which will add considerably to her earning powers. The machinery, which is constructed by the builders, consists of one set of triple-expansion engines, supplied with steam from three boilers and of sufficient power to ensure a sea speed of 11 knots.

Mexico.—Recently Messrs. William Hamilton & Co., Port Glasgow, launched the steamer *Mexico*, which they have built for the Compania Mexicana de Navagacion, Vera Cruz, for their passenger service in the Gulf of Mexico. This vessel, which is the third Messrs. Hamilton have built for the same owners, is of the following dimensions:— Length 322 ft., breadth 43 ft. 3 in., and depth (moulded to main deck), 22 ft. 2 in. She has been built to Lloyd's highest class under special survey, and has a full poop, long bridge, topgallant forecastle, and promenade deck extending the full length of the bridge. Accommodation is provided for 80 first-class passengers. The dining-room is at the fore end of the bridge, and extends from side to side of the vessel, while the entrance hall and lounge, with some special state-rooms, occupy the deckhouse immediately above the dining saloon. There is a commodious smoke-room in the after end of the house on the bridge deck abaft the machinery space. There is accommodation for twenty-five second class passengers, with smoke-room and entrance hall. The machinery, which is being supplied by Messrs. D. Rowan and Co., Glasgow, is capable of giving a speed of about 13 knots, and the boilers are arranged for oil burning.

Den of Ogil.—Messrs. Russell & Co., Port Glasgow, have launched a first-class cargo steamer which they have built to the order of Messrs. Charles Barrie & Sons, Dundee. The vessel, which is 423 ft. 6 in. in length, 56 ft. in breadth, 31 ft. 3¾ in. in depth (moulded), and of 5,900 tons gross, has been built to the highest class at Lloyd's. She is intended for her owners' Eastern trade. Messrs. Rankin and Blackmore, Greenock, will supply the engines. During construction the *Den of Ogil* was superintended by Captain Singer, Messrs. Barrie's marine superintendent; Mr. J. Lang, for the engines; and Mr. J. Sandeman, resident surveyor.

Emperor Alexander III.—On October 16th, from the yard of Messrs. Wm. Denny & Bros., Dumbarton, the *Emperor Alexander III.* was launched. The vessel is one of the four large twin-screw steamers being built on the Clyde to the order of the Russian Steam Navigation and Trading Company, Odessa—two at the yard of Messrs. John Brown and Co., Clydebank, and two at that of Messrs. Wm. Denny and Brothers, Dumbarton. The first vessel in each yard is now almost ready for speed trails. The principal dimensions are:—Length between perpendiculars 380 ft., breadth moulded 51 ft., and depth moulded 30 ft. 6 in. The vessels are of the combined passenger and cargo type, and are intended to develop the trade between Black Sea ports and Alexandria. The passenger accommodation is of an exceptionally fine description. Of first-class passengers 300 will be carried, and of second class 54. The machinery consists of two sets of direct-acting, surface-condensing, triple-expansion engines, supplied with steam by four single-ended boilers working at a pressure of 180 lb. The chief inspectors of the vessels have been Captain Heyman and Mr. T. H. Lichkovacho, who superintended the installation of the machinery.

LAUNCHES—Irish.

Cardiganshire.—On September 30th, at high water, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their south yard the twin-screw steamer *Cardiganshire*, to the order of the Royal Mail Steam Packet Company, London. The *Cardiganshire* is 516 ft. in length with a gross tonnage of about 10,500, and has been built under special survey for the highest class in Lloyd's Registry, besides complying with the requirements of the Board of Trade for a passenger certificate. Accommodation for a few first-class passengers is provided in comfortable state-rooms in a large house amidships, while the poop and bridge spaces and the main deck can readily be made suitable for accommodating 1,300 steerage passengers. The cargo space is divided into seven

holds, one of which has also been arranged for use as a deep water ballast tank. Owing to the adoption of the girder system of construction these holds are free of obstruction, and are thus capable of receiving the largest type of consignment. One of these holds has been completely insulated and fitted up for the reception of general refrigerated cargo, such as frozen meat, dairy produce and fruit, a portion of the space on the main deck being reserved for the ship's provisions. For the preservation of this cargo an extensive plant of refrigerating machinery has been installed. An installation of wireless telegraphy has been provided. The propelling machinery consists of two independent sets of triple-expansion engines with the necessary auxiliary appliances; steam being supplied by two double-ended and two single-ended boilers working under forced draught. Inside three minutes from the time the ship took the water she was moored alongside the jetty.

Orduna.—On October 2nd, the large triple-screw mail and passenger steamer *Orduna*, built to the order of The Pacific Steam Navigation Company, Liverpool, was launched at Belfast, by Messrs. Harland & Wolff, Ltd. The new vessel is 569 ft. 3 in. in length over all, 67 ft. beam, and will have a gross tonnage of about 15,600 tons, and has been designed specially for The Pacific Company's Service to the East and West Coasts of South America, having, besides extensive passenger accommodation, very large capacity for cargo, the arrangements for which are of the most approved character. She is very strongly constructed with double bottom throughout, ten watertight bulkheads and seven steel decks, and will have accommodation for, in all, over 1,100 passengers—first, second, intermediate and third class. The first-class dining saloon on the main deck extends the full breadth of the vessel. It is framed and panelled and finished in white and gold. This saloon will seat 169 persons, and a nursery, to accommodate thirty-three children, adjoins the saloon. The first class smoking room and verandah are situated on the promenade deck, together with the first-class lounge. There are an admirably equipped gymnasium and a children's playroom; and an enquiry office, shop, barber's shop, armoury room and dark-room, and the vessel will also be equipped with an up-to-date laundry. The first-class state-rooms are arranged on the shade and awning decks, and are all fitted with comfortable bedsteads. Each room has open washbasin, wardrobe etc., with an easy chair. A number of the state-rooms are intercommunicating. On the awning deck the sleeping rooms are arranged on the tandem principle, giving natural light and ventilation to all rooms. There are also rooms for passengers' servants, suitably furnished. Separate rooms are allotted on the awning deck for the British doctor, Spanish doctor, and surgery. The second-class accommodation is as follows: The dining saloon on the main deck extending the full width of the ship will seat 178 persons. The smoking room is at the after end of the promenade deck, and the verandah and lounge are situated on the shade deck. The second-class state-rooms generally are treated in a similar manner to the first-class, with folding iron beds. The intermediate accommodation consists of dining saloon to seat 148 persons, general room and state-rooms, suitably furnished and in good positions in the ship, and this class will be very comfortable. The third class accommodation is also of a superior character, and all arranged to pass the requirements of the Board of Trade and Spanish law. The refrigerating plant is of the horizontal duplex marine type, with surface condenser. The steering gear is of Messrs. Harland & Wolff's latest type. There are fourteen cargo and warping winches and four electric boat winches, besides capstan and steam windlass. The steamer will be equipped with a sufficient number of lifeboats to accommodate all persons on board. Complete installations of electric light, wireless telegraphy and submarine signalling, together with combined Semaphore and Morse signalling appliances have been fitted. The propelling machinery is a combination of reciprocating engines and low-pressure turbines. The vessel will have two steel pole masts, fore and aft, schooner rigged, and is being built to the highest requirements of Lloyd's for 100 A1 class. The *Orduna* will be the largest steamer engaged in the service between Europe and the West Coast of South America. Two mail steamers, similar to the *Orduna*, are now being built for the Company, and they will be named *Orbita* and *Orca*. A special feature of the *Orduna* will be the large number of single-berth cabins for passengers, and in the first class the remainder of the sleeping rooms will have only two bedsteads in them, though a few of the cabins will be fitted with an upper folding Pullman berth for the accommodation of families. In the second-class no sleeping cabin will be fitted with more than three berths, many of the rooms having only one or two berths in them. During construction the vessel has been under the survey of Captain Drummond, the Pacific Co.'s marine superintendent and Mr. H. Forbes, superintendent engineer. Captain Drummond and Captain Lawrenson, local inspector, represented the owners at the launch.

Galiano.—On October 18th, The Dublin Dockyard Company launched the second of the two fishery cruisers which were ordered from them by the Canadian Government, for the protection of fisheries on the Pacific Coast, and for hydrographical purposes. The vessel is a duplicate of the *Malaspina* which was launched in July last, and is now on her way to Esquimalt, B.C., which is the base from which the vessels will operate. The dimensions of the vessels, which have been built to the highest class in Lloyd's register, are:—Length between perpendiculars, 162 ft.; breadth moulded, 27 ft.; and depth moulded, 13 ft. 11 in. The machinery will be supplied by Messrs. David Rowan & Co., Glasgow, and the vessels will have a speed at sea under working conditions of 14¾ knots. A Cochran (Annan) donkey boiler, fitted with patent seamless furnace, has been installed on the *Galiano*. The two vessels have been built under the superintendence of Mr. R. L. Newman, of Montreal, consulting naval architect to the Canadian Government, and Mr. F. L. Warren, of London.

TRIAL TRIPS.

H.M.S. Sarpedon.—A most successful series of sea trials has just been completed by H.M.S. *Sarpedon*, an ocean-going torpedo-boat destroyer built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., at their Wallsend shipyard. An ample supply of steam was steadily maintained during all the trials. These included an eight-hours' run at full speed, a twenty-four-hours' trial at cruising speed, a trial running astern, steering and turning trials, gun tests under service conditions, and the testing of all the deck machinery and the torpedo launching tubes. For Launch, see July issue.

Argentino.—The new steamer *Argentino*, built and engined by the Ailsa Shipbuilding Co., Troon, to the order of Messrs. Duncan Fox & Co., London, for the Sociedad Importadora y Exportadora de la Patagonie, for service on the Patagonian Coast, ran official trials recently on the Firth of Clyde. The trials were satisfactory in every respect, the speed attained on the measured mile being three-quarters of a knot in excess of contract requirements. For Launch, see August issue.

Dredgers.—The trials of the reclamation plant recently built by Messrs. Fleming & Ferguson, Paisley, were successfully completed recently. The plant consists of five vessels (a reclamation steamer, a twin-screw tug and three 1,000-ton barges), and is intended for use at the port of Lagos, West Africa. The vessels have been constructed to the order of the Crown Agents for the Colonies to designs by Messrs. Coode, Matthews, FitzMaurice & Wilson, London, under whose supervision the work was carried out, Mr. Robert Anderson, Renfrew, being resident inspector. The trials were carried through under the superintendence of Mr. A. T. Coode, Mr. A. E. Hill and Mr. R. Anderson.

Corvin.—On September 19th, this steel screw steamer was taken for her trial. She has been built by Messrs. W. Dobson and Son, of Walker-on-Tyne, to the order of Messrs. The Hungarian Levant Steamship Co., Ltd., of Budapest, for their service between Braila, Galatz and other Danubian ports and Constantinople. The trial proved quite satisfactory. For Launch, see October issue.

Edward L. Doheny.—On September 24th, the *Edward L. Doheny*, which has been built and engined at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the order of the Petroleum Carriers, Ltd., of Glasgow, went for a very successful trial trip. The steamer, which is built of steel, is intended for the carriage of oil in bulk. She has been constructed on the Isherwood system of longitudinal framing, to the highest class in Lloyd's register. The vessel is 430 ft. long and carries over 9,800 tons deadweight. The oil cargo and fuel are carried in twenty-two tanks arranged in pairs. Each tank has a very complete system of steam heating in order to deal rapidly with heavy oils. In addition,

there is a hold forward for general cargo, with deep ballast tanks. An installation of wireless telegraphy will be fitted. The machinery, which has been constructed at the Neptune works, consists of a set of triple-expansion engines supplied with steam from two large boilers working on forced draught and arranged to burn oil fuel. On the trial trip everything worked satisfactorily, and a speed of 11½ knots per hour was attained. Messrs. Jacobs & Barringer, London, consulting engineers, have superintended the building of the vessel. She is the second oil tank steamer constructed at the Neptune Works for the same owners.

Winterton.—On September 24th, the fine steel screw steamer *Winterton*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. The Denaby and Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trials. The trials passed off most successfully and the vessel proceeded to Hull under the command of Captain Newlove, where she will load for the River Plate. The hull and engines have been constructed under the superintendence of Mr. W. W. Nicholas, of Messrs. Nicholas & Meek, Hull. For Launch, see October issue.

Vasilefs Constantinos.—On September 25th, the s.s. *Vasilefs Constantinos* (King Constantine), lately launched from the shipyard of Messrs. Short Brothers, Ltd., at Pallion, Sunderland, left the Wear for her official trials, which were very successful, the engines running to the satisfaction of all on board; a mean speed of nearly 11 knots was obtained in rather a rough sea. It is interesting to note that this steamer —named after the King of Greece, with his permission—was launched on the 25th July, upon which day His Majesty led his troops to victory in one of the battles in Macedonia. For Launch, see October issue.

Muristan.—On September 26th, the trial trip of the handsome steel screw steamer *Muristan*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London, took place. The vessel has been built to Lloyd's highest class and her principal dimensions are :—Length overall, 331 ft. 6 in.; breadth, 46 ft. 6 in., and depth, 23 ft. 5½ in., with long bridge, poop and topgallant forecastle. The saloon, state-room, captain's, officers' and engineers' rooms, etc., are fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large after peak ballast tank, six steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines have been supplied from the Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in. and 62 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The engine room auxiliaries include a winch condenser, gravitation feed water filter, evaporator, feed and ballast pumps, etc., of the "Cmew" type. The owners were represented by Mr. Archibald Walker, under whose superintendence the ship and machinery have been built, and Mr. James Innes attended on behalf of Lloyd's Registry. The performance of the ship and machinery was entirely satisfactory.

Frimley.—On September 29th, the steel screw steamer *Frimley*, which has been built by the Northumberland Shipbuilding Co., Ltd., to the order of Messrs. Houlder, Middleton & Co., Ltd., London, to augment their fleet of fine steamers, left the Tyne for her official trip. The trial trip proved in every way satisfactory and a speed of 12½ knots was obtained. The vessel afterwards proceeded to New York under the command of Captain Griffiths. For Launch, see August issue.

Gelria.—On October 8th, the final trials and the formal handing over on the Clyde of the new twin-screw steamer *Gelria*, built by Messrs. Alexander Stephen & Sons, Linthouse, for the Koninklijke Hollandsche Lloyd, marked an important development in the passenger service between Europe and South America. The *Gelria* is one of two steamers which were ordered from the Linthouse yard in December, 1911, and she and her sister ship, the *Tubantia*—which is to be launched soon—are intended to augment the new service of "de luxe" steamers on their owners' mail line to South America. On this service there are already two Linthouse-built vessels—the *Hollandia* and the *Zeelandia*. The *Gelria* is 560 ft. in length, 66 ft. in breadth, 39 ft. in depth, and of 14,053 tons gross. Messrs. Matthew Keenan & Co. have covered all the boilers and pipes with their patent composition. The new vessel left on the 9th October for Amsterdam, carrying a large party of Dutch guests. Early in November she will sail on her maiden voyage to Monte Video and Buenos Ayres, calling at a number of intermediate ports. For Launch, see July issue.

Swanmore.—This large and finely modelled vessel, which has just been completed by Messrs. Joseph L. Thompson and Sons, Ltd., of Sunderland, has recently been taken to sea for her official trip. She has been specially built to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, for their Liverpool-Baltimore line. The trial trip was most successful in every way, an average speed of 13 knots being attained on the measured mile, and everything worked smoothly and gave complete satisfaction to the owners' representatives, Messrs. D. Beatson and C. Surtees, under whose superintendence the vessel has been built. For Launch, see October issue.

Ruel.—On October 14th, the trial trip of the new steel screw steamer *Ruel* took place in the presence of Mr. L. R. Turnbull and Mr. C. H. Turnbull, representing Messrs. Turnbull Bros.' Shipping Co., of Cardiff, owners of the vessel, Mr. Hardy, superintendent engineer for the owners, Mr. Sutton and Mr. Landreth, of Messrs. Stephens, Sutton and Stephens, Mr. J. Bourn, representing the shipbuilders, and Mr. F. Lewins and Mr. J. Daglish, representing the engine builders, when the machinery in a series of runs over the measured mile gave entire satisfaction. This vessel is 367 ft. long, 30 ft. 9 in. broad and 27 ft. 4 in. depth, and is arranged to carry 7,000 tons on a moderate draught. She has been built to Lloyd's highest classification and is fitted with all the latest improvements for the rapid handling of cargoes. The propelling machinery, which has been constructed and fitted at the Northumberland Engine Works of Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne and Sunderland, consists of a set of their latest type of triple-expansion engines, having cylinders 25 in., 41 in., 68 in. by 45 in. stroke, steam being supplied by three large steel boilers working at a pressure of 180 lbs. per square in. After the trial trip the vessel left for Cardiff under the command of Captain Storey.

T.S.S. Ulysses.—On October 22nd, the new twin-screw steamer *Ulysses* left Belfast Harbour and proceeded down Belfast Lough to Carrick Roads, where compasses were adjusted, the vessel afterwards having a series of runs on the measured mile. The results of these trials were of the most satisfactory character, and the vessel afterwards left for Glasgow to take in cargo, and will call at Liverpool thereafter to complete cargo, and embark passengers for her initial voyage to Australia, *via* the Cape. For Launch, see August issue.

Strabo.—On October 23rd, the new steamer *Strabo*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. Lamport & Holt, Ltd., Liverpool, ran trials on the Firth of Clyde. The machinery was supplied by Messrs. David Rowan & Co., Glasgow. On the completion of the trials, which were in every way satisfactory, the vessel proceeded to Glasgow to load.

LETTERS TO THE EDITOR.

(*Continued from page* 125.)

Re AN ENGINEERS' RESERVE FOR THE ROYAL NAVY.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—The Institute of Marine Engineers has, I believe, recently formed a committee of its members to consider the question of a Reserve of Engineers for service in the Royal Navy. That being so, it seems to me that much information and various opinions on the subject could be obtained, if your columns were used to put forward suggestions relative to the formation of an efficient body of marine engineers that could be relied upon in the case of a national emergency. At present an engineer can only join the Reserve with Warrant Rank, and as a Warrant Engineer in the Royal Naval Reserve I would like to point out some of the disadvantages attached to the holding of that rank.

In the first place, all correspondence must be addressed to a Registrar at one of the shipping offices in the same manner as for stokers and seamen. (This is not so with upper deck officers in the Reserve). They are compelled to wait their turn, and are treated in the same manner as stokers when obtaining the retainer at the shipping office. (This is not so with the upper deck officers).

When serving in the Fleet they rank after all Warrant Engineers R.N., which means they are junior to the Warrant Mechanician, who is a promoted stoker. They may at any time be placed under the orders of a Chief Warrant Mechanician.

They have absolutely no prospect of promotion to any higher rank, even if recommended for the same. They are treated by the Commissioned Engineers R.N. as being unworthy of notice; and then, after serving for a period of fifteen years they receive the same long service and good conduct medal as given to the stoker and seaman.

To remedy the above I would suggest that the Admiralty be asked to offer Commissions as Engineer Sub-Lieutenants, or Engineer Lieutenants to eligible engineers, to be filled by promotion of warrant engineers, or direct.

The conditions of entry being :—I. The holding of a position of responsibility afloat or on shore, at not less than a certain salary. II. The successful passing of an examination set by the Admiralty. III. A period of service on one of H.M. ships before the appointment is confirmed.

The views of marine engineers on the above subject would prove of great interest to those who take an interest in the country's welfare.—Yours respectfully,

WARRANT ENGINEER, R.N.R.

London, October 25th, 1913.

[We shall be pleased to receive communications from other engineers on this subject.—ED.]

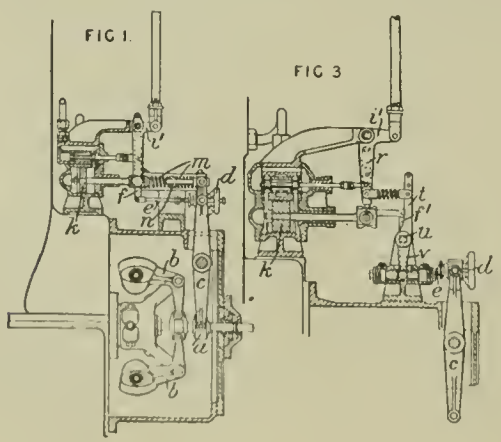
SOUDAN GOVERNMENT.—There are occasional vacancies for engineers, we are advised, to serve on the steamers and on works within the jurisdiction of the Soudan Government. The service is generally from Khartoum, sailing on the Blue and White Nile, and other rivers, and the engineers are in responsible charge of the steamer and machinery, the crew being natives of the country. Further particulars may be obtained on application to Sir A. L. Webb, C.M.G., Queen Anne's Chambers, Westminster.

ENGINEERS FOR TEA PLANTATIONS.—We have received intimation to the effect that there are several vacancies for young engineers to serve on tea plantations in India, and any enquiries or applications received at this office will be duly forwarded to the proper quarter, should any of our readers be interested in the possibilities in connection with the cultivation of tea.

Abridgments of New Patents.

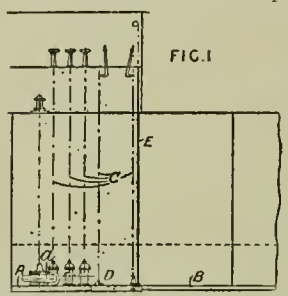
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn London, W.C

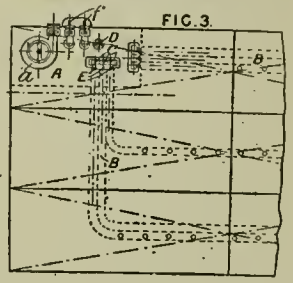
12,926. Centrifugal Governors. The muff *a* is connected by a lever *c*, a nut *d*, and a screwed rod *e* to the valve-lever *f*



or *r* of the relay, either directly as shown in Fig. 1, or through a lever and link, *v*, f^1, Fig. 3, the valve-levers being pivoted eccentrically to the levers i^1 connecting the relay piston *k* with the engine throttle. In the apparatus shown in Fig. 1, a spring *m* is interposed between the levers i^1, *c* so that the load on the governor varies with the position of the piston *k* and the throttle, whereas in the apparatus shown in Fig. 3, the lever i^1 is connected resiliently with a lever *t* on the spindle *u* of which the pivot for the lever f^1 is eccentrically mounted, so that a movement of the piston *k* adjusts the valve-lever *r* to a small extent independently of the governor *b*. A cross-head *n* between the two parts of the spring *m*, and the bottom end of the lever *t*, are connected to dash-pot pistons.

13,378. Floating Docks. The pump or pumps *a* for emptying a floating dock are mounted within or immediately above a closed pump or water-collecting pocket A, into which the water drains from the compartments of the dock through separate pipes B. The passage of water from the compartments to the sump is regulated by means of valves C, and a valve D is provided for communicating with the compartment immediately above the sump. The dock is flushed by means of inlets *f* to the sump A, whence the water passes to the various compartments. Stand-pipes E are





connected to the pipes B in order that the depth of the water in the various compartments may be sounded. In the case of sectional docks, provision is made for making and unmaking the joints of the ducts, and water must be prevented from entering the section to be docked by covering the limber holes in the bottom plating. In the case of self-docking docks of the sectional pontoon type, where only the side walls are continuous and the pontoon in separate sections, a main duct is connected to the side walls and leads to the sump, the ducts from the troughs of the various sections being connected to the main duct, and the distributing valves are situated at the junction of the branch ducts to the main duct.

13,742. Framing and Decks of Ships. In passenger vessels of the construction described in specification 2588/06, unobstructed space is obtained in the cabins by arranging the strong transverse frames *a* so that as far as practicable they coincide with the transverse partitions of the cabins. The longitudinal deck beams *d* are fitted above the deck *f* except where longitudinal partitions occur,

when they are fitted as usual to act as supports for the cabin walls. In vessels of the ordinary construction, by means of pillaring, the transverse beams below the deck may be reduced in depth or dispensed with, and longitudinal or transverse beams may be fitted above the deck. The deck longitudinals are embedded as shown in the deck covering.

LIFEBOAT TRIALS AT GLASGOW.—A series of tests were made at Glasgow recently by the Marine Department of the Board of Trade with the Lundin decked lifeboat, which were all carried out satisfactorily.

MISCELLANEOUS.

MESSRS. HASELTINE, LAKE & Co. wish to draw attention to their new address at 28, Southampton Buildings, London, W.C., as they find that many letters are still being sent to their former address.

NAVAL ARCHITECTS AND MARINE ENGINEERS.—The 21st annual meeting of the American Society of Naval Architects and Marine Engineers will be held on December 11th and 12th. A number of papers will be read.

GYROSCOPES.—An interesting paper was read on the subject of "The Gyroscope and gyroscopic action in engineering practice" by Mr. Thos. R. Thomas on October 20th, before The Institute of Marine Engineers.

SAFETY OF LIFE AT SEA.—The International Conference on Safety of Life at Sea, convened by Great Britain, will hold its opening meeting at the Foreign Office on November 12th, when the President of the Board of Trade will receive and welcome the delegates on behalf of His Majesty's Government.

A NEW CLUB.—On Nov. 8th a new club for engineers will be opened at Manchester. A membership of 554 has already been obtained, which number it is confidently expected will be greatly increased before long. The hon. sec. is Mr. Edmund L. Hill, and the address Albert Square, Manchester.

THE "VOLTURNO" FIRE.—The enquiry regarding the s.s. *Volturno* will be heard before the Earl of Desart, sitting as Wreck Commissioner, assisted by duly qualified Assessors, one of whom will be specially nominated as having expert knowledge as to fires on ships.

THE "TITANIC'S" CAPTAIN.—It is stated that a monument is to be erected to the memory of Capt. E. J. Smith, at Lichfield, in the county in which he was born, and a stained-glass window and tablet will be placed in the new cathedral at Liverpool. A committee has been formed for the purpose.

A SHIPBUILDER'S DEATH.—Mr. Alex. M'Credie, a retired shipbuilder, of Govan, N.B., died at that place on October 17th. In 1882, leaving Messrs. A. Stephen & Sons, Linthouse, he started shipbuilding on his own account at Ayr, in partnership with another gentleman. In 1886 he formed the Ailsa Shipbuilding Co., Troon. He retired in 1906

"TITANIC" LAW SUITS.—The appeal by the Oceanic Steam Navigation Co. in connection with the *Titanic* disaster will be taken on November 10th. The appeal involves the question of alleged exemption from liability because of the terms expressed on the passengers' tickets, the Company denying negligence.

SERVICE FOR SEAFARERS.—On October 22nd the ninth annual service for seafarers was held at St. Paul's Cathedral. The congregation numbered about 4,000. A number of organizations were represented, including the Shipping Federation, Lloyd's, Lloyd's Register, Sailors' Home, etc., etc. The Archbishop of Canterbury conducted the service.

FIRE EXTINGUISHING AND FUMIGATION.—A demonstration of the Halley (SO_2) fire-extinguishing and fumigating apparatus was carried out on the 28th October. The demonstration took place on the s.s. *Radja*, a new vessel just completed by Messrs. Hamilton & Co., Ltd. In the trial of the apparatus actual conditions were approximated as near as possible.

TRAFALGAR DAY.—The 21st October was the 108th anniversary of the Battle of Trafalgar, and the memory of Lord Nelson was honoured in many ways. The Nelson Column in Trafalgar Square was decorated and floral tributes were placed on the hero's tomb in St. Paul's. The *Victory* at Portsmouth was also fittingly decorated. The annual dinner of the Navy League was held on this date.

BANDING OF PROJECTILES.—Experiments are now being made on Mr. Sherard Cowper-Coles' new process for the banding of projectiles, which reduces the amount of copper necessary to less than one-half and has the additional advantage that it eliminates the necessity of a groove in the projectile to hold the band in position. Some preliminary tests have been made and have proved highly satisfactory.

CHRISTMAS AND NEW YEAR GREETINGS.—G. A. Pratt, nautical bookseller and stationer, of 21 and 22, Oxford Street, Southampton, has a splendid series of nautical designs in Christmas cards and greetings for the coming season. Sample books and prices will be sent by return of post on application, and estimates for special requirements quickly furnished.

ANGLO-AMERICAN EXPOSITION (SHEPHERD'S BUSH). A meeting of the Engineering General Committee of the Anglo-American Exposition, London (May to October), 1914, was held on October 7th at the Hotel Metropole, when Mr. Alexander Siemens was unanimously elected chairman of the committee, which is a large and representative one and includes many well-known gentlemen.

PARSONS' TURBINE CO.—At the annual meeting of Messrs. Parsons' Marine Steam Turbine Co., held at Newcastle recently, it was stated that the nett profit for the year amounted to £32,182 8s. 11d., and with the amount brought forward from the last balance sheet of £18,810, made the total amount for distribution £50,992. A dividend of 10 per cent. was declared and it was decided to pay a bonus of 5 per cent.

THE S.S. "TRIPOLITANIA."—With reference to the stranding of this vessel on the Cornish Coast, and referred to in former issues of this journal, two companies are still engaged in an attempt to refloat the vessel, and altogether she has been moved about 90 ft. seaward. The vessel is still in a bed of sand, which is being removed by steam derricks and dumped on the land side. The salvors are not without hope, but of course a lot depends upon climatic conditions.

BOILER TUBES.—Mr. Sherard Cowper-Coles has granted a license to the British Mannesmann Tube Co. for ferro-zincing or ironizing boiler tubes to prevent pitting or corrosion. They are erecting a plant for the purpose at their works at Landore. The process consists of coating the tubes with a thin layer of pure iron, which may or may not be afterwards coated with zinc. The coating of pure iron is found to be very inert to chemical action.

NAVAL FIGURE HEADS.—Messrs. Castle's Shipbreaking Co., Ltd., of Millbank, have in course of erection a show-room and museum where they will house the figure heads of the "wooden walls" they have broken up. They have in their possession the figurehead of the *Fighting Téméraire*, immortalized by Turner's picture. Since 1838 the firm has broken up nearly 1,000 ships, representing 1,200,000 tons deadweight.

THE NAVY LEAGUE calls upon the people of the British Empire to support the demand that not less than six capital ships shall be laid down in each financial year from the present until 1918; that the *personnel* of the fleet be substantially increased; that ships provided for in each year's building programme shall be laid down at the earliest possible moment; that docking accommodation be enlarged and more ample reserves of guns, coal, stores and oil fuel should be secured.

THE SHIPOWNER'S BUSINESS.—Mr. A. A. Booth, chairman of the Cunard Company, delivered on October 21st, at the Armstrong College, Newcastle-on-Tyne, an interesting lecture on "The Shipowner's Business." Sir Walter Runciman, Bart., presided. Mr. Booth, in showing that the shipping industry lay at the root of our national prosperity, stated that the country's income from shipping would be about 110 millions sterling, out of an estimated nett income for the present year of 662 millions sterling.

REGISTRAR-GENERAL OF SHIPPING AND SEAMEN.—The President of the Board of Trade has appointed Mr. Charles H. Jones to be Registrar-General of Shipping and Seamen in succession to Mr. H. N. Malan, who has retired on a pension at the age of sixty-two, and is at present on a pleasure tour to India. Mr. Jones has been in the Registrar-General's department for forty years and has a wide experience of the mercantile marine. He had been assistant registrar for some years and his appointment is the first occasion of a member of the staff being so promoted.

SHIPWRIGHTS' COMPANY.—The Worshipful Company of Shipwrights, of which Sir Edward Clarke, K.C., is the Master, entertained the members of the National Conference on Sea Training to dinner given at the Fishmongers' Hall on October 21st, 1913. A very distinguished company was invited to meet the members, and included Prince Louis of Battenburg, who was admitted that day to the Freedom of the Company, Lord Inchcape, Lord Devonport, Sir Thomas Sutherland, Geoffrey Drage, Esq., and many others. The speeches were not only interesting, but also most instructive, and the urgent necessity for the thorough promotion of extensive sea training was clearly emphasized.

Model Engineering and Scientific Exhibition.—The fourth exhibition of models, tools and scientific apparatus, organized by the proprietors of "The Model Engineer," was held at the Royal Horticultural Hall, Westminster, S.W., from October 10th to 18th. A splendid entry of engineering models from all parts of the kingdom, and some very interesting exhibits were gathered together. Special rooms were devoted to wireless telegraphy in operation, and to aeroplane models of all kinds, while a completely equipped workshop was manned by members of the London Society of Model and Experimental Engineers, who gave demonstrations of model making and workshop operations. The principal model yachting and power boat clubs of London showed their latest craft, and this section included the team of English boats which recently won the international championship at Paris.

Shipping Exhibition.—Success is apparently already assured for the Shipping, Engineering and Machinery Exhibition, which is to be held at Olympia in the autumn of next year. An exceptionally strong list of patrons includes the leading shipping and engineering magnates, the First Sea Lord and the Director of Naval Construction. The variety of the exhibits can be gauged from the sections into which they have been divided, the principal being the naval engineering section, which deals with war vessels and their equipment; naval architecture, embracing every class of ship; marine engineering, for a review of heavy machinery, which will be shown working under steam, oil, gas, water and compressed air; fishery exhibits, general marine and engineering and foundry and machine tools. The Society for Nautical Research has arranged for a magnificent historical section, relating to seafaring and shipbuilding. A very strong point in the working is the fact that each exhibitor has a direct interest in the enterprise, and will receive a rebate of 20 per cent. on the value of the space taken. The whole exhibition will be arranged in logical sections and carefully catalogued, so that the business visitor may find just what he wishes to see without delay.

A New Oil Burner.—A demonstration was given recently at Purfleet, on board the Anglo-American Co.'s *Iroquois*, of a mechanical system of oil burning, which is new in England, but has made some way in America. The makers in this country are Messrs. Brigham & Cowan, South Shields, and the inventor is Mr. W. A. White, resident in the United States. As applied to a natural draught boiler, an air heating front, consisting of a disc casting with a number of projecting vanes, is fitted over the furnace mouth. These vanes form passages for the air which becomes heated in its progress to over 200 degrees F., and finds its way eventually to the centre of the disc, where it is admitted to the furnace in swirling streams, surrounding the burner, the perforated jacket, and the sliding cone. By means of a series of longitudinal channels formed in the periphery of a cylindrical cone-shaped member, the burner mechanically divides the liquid fuel under pressure into a number of separate streams. The streams are attenuated and given a spiral motion, then united into a swirling mass prior to their ejection through the burner nozzle. A conical valve fills the chamber to close the outlet, and is retracted in order to supply a regulated quantity of fuel to the burner orifice.

Testing of Lubricants.—Messrs. The Stern Sonneborn Oil Co. write us pointing out the futility of the rough-and-ready methods of oil testing which are now so frequently recommended. They say that small benefit is likely to result from the use of such methods, which are misleading, and in any case of small practical value in the absence of any standard to which to work. A good many years ago they recognised the necessity of being able to test the values of lubricating materials under actual working conditions, and the importance of standardizing the results obtained. The Sternol oil-testing machine is the outcome of their efforts to produce a comparatively simple, practical and reliable apparatus. This machine is capable of reproducing the exact working conditions of any machinery, steam, gas and oil engines, including load, speed, cylinder pressure, temperature, etc. By its means one can pronounce with certainty as to the suitability of an oil or grease for any given purpose, and also to prepare charts showing the comparative efficiency of various qualities. The machine is installed on the premises of the Stern Sonneborn Oil Co., Ltd., Royal London House, Finsbury Square, London, E.C., where tests are carried out daily. Any samples submitted are tested free of charge and, if desired, an appointment will be made so that the tests can be done in the presence of any person representing the firm by whom the samples are submitted.

TECHNICAL SOCIETIES.

N.E.C. Inst. of Engineers and Shipbuilders.—The first winter meeting was held on October 31st, and other meetings will be held on Nov. 28th, December 19th, January 30th, February 27th, March 27th and April 24th.

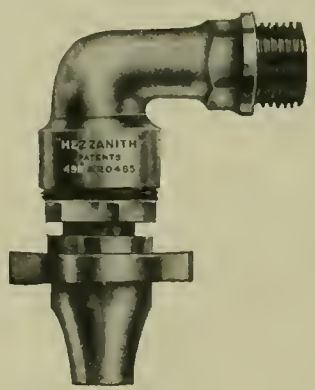
N.E.C. Inst. of Engineers and Shipbuilders.—Graduate Section.—During the coming sessions the following papers will be read:—Nov. 15th, "Centrifugal pumps"; Jan. 31st, "Breakdowns at sea;" April 25th, "Gyroscopic compass." The winter session was opened on Oct. 11th.

Engineers and Shipbuilders in Scotland.—The dates for meetings have been arranged as follows:—Oct. 21st, Nov. 18th, Dec. 16th, Jan. 20th, Feb. 17th, March 17th, April 21st.

Institute of Marine Engineers.—On Nov. 21st Mr. Thomas L. Devitt delivers his presidential address, and the annual dinner will be held on Nov. 21st. On Dec. 1st a paper on the "Upkeep and management of boilers on a tramp steamer" will be read, and on Dec. 15th a paper on "Electric welding."

THE "HEZZANITH" TAP.

THE "Hezzanith" draw-off tap or valve, illustrated herewith, has been designed to ensure an easy, quick and effective control of the domestic water supply, and provides that, whether open or closed, and with various pressures there shall be an effective prevention of waste, and that where fixed over drains, a complete exclusion of foul vapours will be effected. Ease and rapidity in manipulation are afforded by control of the fluid pressure, in place of the resistance, which obtains in all forms of water draw-off taps hitherto in use. The usual packing box being eliminated there is no packing friction to overcome, and consequently, no leakage therefrom, which annoying waste is so universal



with common taps after a short period of service. The leather washers as fitted to this new tap, owing to the absence of friction, will last for many years and, moreover, the life of the tap is prolonged owing to the wear on both spindle and seating being reduced to a minimum. To sum up, among the advantages which are claimed for the patent self-closing "Hezzanith" tap may be mentioned—the absence of splash, there is no waste of water, no concussion in the pipes, it cannot leak, is suitable for high or low pressures and the price is the same as for ordinary water taps. The tap, which can be obtained for either hot or cold water, is being placed on the market by Messrs. Heath & Co., Ltd., of Crayford and London.

Lloyd's Register of Shipping.—An exhaustive and interesting account of the Society's operations is set out in the annual report for the year 1912-13, ending 30th June, 1913. From it we learn that at that date 10,466 merchant vessels, registering over 22½ million tons gross, held the Society's classification. During the year 651 new vessels were classed, the gross tonnage being 1,664,667, the highest recorded for any one year. The Society's surveying staff now numbers 353 officers.

The Marine Engineer

And Naval Architect.

LONDON, DECEMBER, 1913.

EXPLOSIONS IN DIESEL ENGINES.

ONE reads, from time to time, isolated accounts of explosions in connection with Diesel engines, but a disjointed record, as this naturally must be, leaves little or no permanent impression on one's mind as to the number of breakdowns of this nature. We believe that, although a certain number of cases have been reported, it is probable that a considerably larger number have actually occurred, but are unrecorded, as manufacturers are not likely to advertise any breakdowns with their manufacturing products, while in the process of making, or installation, for quite obvious reasons which it is unnecessary to discuss here. Since the autumn of 1909 there are no fewer than eighteen reported cases of breakdowns, nearly all of which were due to explosion. It would seem that the time has come when the risk involved in this class of engine should be better understood, and for this purpose we desire to draw attention to the report issued by Mr. G. S. Taylor, His Majesty's Inspector of Factories, on the explosion of a Diesel engine at the Bray Electricity Station in Ireland. The engine in question was a single-cylinder, twelve inches diameter, working on the four-stroke cycle and was capable of developing fifty horse-power, which was utilised in driving an alternating-current generator. The engine was fitted with two compressed air vessels for starting purposes, and with a blast-air vessel connected with the engine containing air at about 900 lbs. per square inch, from which the air for feeding and spraying the oil fuel was taken. This latter vessel was a lap-welded mild steel cylinder, three feet in length, eight inches external diameter and $\frac{13}{32}$ inch in thickness, and had circular plugs $1\frac{3}{8}$ inch in thickness, welded into the ends, the upper plug having a hole communicating with the entrances to the valves in the steel head. It appears that the engine was shut down in the morning, and in the evening the attendant noticed a loss of air in the three air vessels. Although efforts to start the engine were made, these were not successful, owing to the lack of sufficient air pressure. On the following day the engine was overhauled, the fuel exhaust and air valves taken out, reground and replaced, the atomizer was cleaned out and the clearances on the valves were re-set. As the air pressure was too low and there was no external motive power available to start the engine up, the instructions of the makers to use compressed carbonic acid gas or oxygen were followed, and a cylinder of compressed oxygen was obtained, which raised the pressure in the blast vessel to 800 lbs. and in the starting vessel to something above 350 lbs. The ordinary fuel, consisting of crude oil, was then emptied from the fuel pump and the pump and pipe charged with ordinary kerosene and the crude oil supply was then turned on. The engine was then started from the supply of compressed air and seemed to be running all right, but when the lever was turned over from the "starting" to the "running" position to take its fuel, no firing stroke occurred, but air could be heard escaping from one of the valves with a hissing noise. Immediately after, a violent explosion occurred at the fuel valve on the cylinder, a blue flame was seen to travel along the blast pipe to the blast vessel, and the latter exploded with great violence. One man was so badly injured that he died in a few minutes, another was so damaged about the legs that both had to be amputated, while the third, who was the assistant engineer and was performing the starting operations, sustained burns to his hands and his face as the result of the explosion at the fuel valve. The blast injection pipe was burst in three places, the pipe had been opened up and flattened over lengths, from eight to ten inches, and the metal at the edges of these fractures was reduced to the thickness of a piece of paper. The interior of the pipe was coated with a more or less oily deposit. The blast vessel was blown into eight fragments, and both top and bottom plugs were completely separated from the cylindrical body of the vessel. The steel head with the valves remained attached to the top plug and the holding-down bolts had not been injured at all. The welding between the top plug and vessel was defective for about three-quarters of the circumference. The welding of the bottom plug was good and the metal had been torn from the weld near the inside of the plug. The blast vessel was coated with a bituminous composition to prevent corrosion, and contained a certain amount of oily matter—no doubt obtained from the air compressor lubricant. It is interesting to note that other evidence of oily deposit in blast vessels is available. Since the accident in question, an explosion of a blast vessel occurred on the *Vulcanus*, a ship fitted with Diesel engines, whilst lying in port. It is stated on good authority that the vessel in this case had an appreciable coating of oily matter. The blast vessel on the *Vulcanus* had been in use for about a year, while that at Bray had been in use over two years and had never been cleaned out. It is quite common knowledge that many explosions and failures of air receivers used in connection with compressed air plants for mines, factories and other works, have been traced to ignition of lubricating oil or vapour carried over into the receivers. After going into the matter in great detail, H.M. Inspector sums up his report with the following conclusions:—The explosion of the blast vessel was caused by the ignition of an oily deposit on its interior. Ignition was transmitted by a flame explosion from the fuel valve casing passing along the blast pipe, but there is no evidence to show whether this ignition originated in the fuel valve casing or was transmitted from the engine cylinder. Ignition was facilitated, and the resultant explosions were intensified by the large volume of compressed oxygen contained in the blast vessel and blast pipe. This compressed oxygen had been used in the blast vessel in order to raise the pressure sufficiently to start the engine, and was so used in accordance with the printed instructions issued by the makers of the engines. Owing to the presence of deposits of lubricating oil carried over from the compressors, the same danger of ignition and explosion exists in blast vessels of Diesel engines as in the air receivers of air-compressing plants. There are considerable practical difficulties which prevent the removal of all the lubricating oil vapour from compressed air before it enters the blast vessels, although entire removal is very

desirable. "Back fires" or explosions are sometimes transmitted from the cylinders of Diesel engines to the fuel valve casings and blast pipes; and ignitions, sometimes accompanied by explosions, occur in the high-pressure air delivery pipes of the compressors. Loss of air pressure from the blast and starting air vessels of Diesel engines occurs more frequently than the engine makers admit. This loss is often due to carelessness, but sometimes due to the inexperience of the engine attendant. It is suggested that the observance of the following recommendations would tend to reduce the risk of explosions and accidents in connection with the running of Diesel oil-engines:— Compressed oxygen, on account of its intense chemical affinity for combustible gases like hydrogen, should not be used for the purpose of re-charging air vessels, and a warning to this effect should be issued by the makers of Diesel engines. Definite instructions should be issued by the makers with regard to the adoption of safe methods for re-charging air vessels. Only competent engineers, or experienced men under the direct supervision of a qualified engineer, should be employed as engine attendants on Diesel plants. Traces of oil or oil vapours should be removed as far as practicable from the compressed air before it passes into the blast vessel. Air vessels, especially blast vessels, should be cleaned and examined internally as far as practicable once every twelve months; they should also be tested hydraulically once in every four years, and the amount of expansion of the vessel under the test pressure should be carefully gauged. Some device should be fitted for preventing the transmission of flame explosions along the compressed-air pipes. A very useful purpose has been served by the exhaustive report thus presented, as the points that required elucidation have been dealt with most conclusively, and distinct directions have been given as to how to avoid disaster in the future. These recommendations are all the more desirable and necessary, owing to the directions which some of the firms of engine builders have issued to their customers in the past, and which they will now no doubt amend.

ROYAL NAVAL RESERVE.

MARINE Engineers who have in time past, enrolled themselves with acceptance in the Reserve, appear to be still without the satisfaction of knowing that the situation created in recent years may be, as it ought to be, altered. Many engineers are deeply interested in the matter from a national point of view and consider that a Reserve of Engineers ought to be established on a good footing, commensurate with the importance attaching to their training and duties. Doubtless the system of training for the engineers of the Royal Navy is an exclusive one and does not admit of direct entry from the Mercantile Marine into the grade of Engineer, and as a consequence the Royal Naval Reserve engineer has been placed in an invidious position to the extent of becoming an anomaly, and gradually dropping out. The question of allowing the R.N.R. Engineer to drop from what appears to be his legitimate place in connection with the wider aspect of National defence, has been discussed from time to time, and the attention of the authorities has been directed to the desirability of considering the wise course of adopting some method to establish a Reserve of Engineers. The education and training of marine engineers admittedly do vary to a great extent according to circumstances; this variation also occurs in all lines of life, but as a large proportion of engineers receive a higher education and training to fit them for their important duties as any upon whom responsibility rests for efficient service and maintenance of discipline, and these are quite capable of holding their own alongside of the engineers specially trained for the navy. As several correspondents and subscribers have pointed out, expectations have been raised that the Institute of Marine Engineers is taking energetic action in the matter, a committee having the subject in hand, and the result is awaited with interest.

CITY COMPANY OF MARINE ENGINEERS.

THE suggestion made by the President and referred to with approval by the Lord Mayor of London, was a very happy and appropriate one, in the course of the ceremony of laying the foundation-stone of the new premises of the Institute of Marine Engineers, to the effect that a city company or guild might with advantage to the community, be established for engineers, thus affording them an opportunity of closer attachment to the shipping and commercial interests of the country, by means of a charter of incorporation in connection with the City of London. There are a few of the existing livery companies which are closely allied to engineering, but it is singular that a company has not previously been formed for engineers. The traditions of the old city guilds are mostly of a healthy character, associated with a good apprenticeship and a keen appreciation of high-class workmanship, and in this respect the formation of an engineers' company or guild, with a revival of the best traditions in connection with this designation, would have the full sympathy of engineers, to whom belong essentially the faculty of associating with their craft a thorough practical training, discipline and good workmanship. Perhaps the company most closely allied to the marine engineer, is that of the shipwright, and in the event of the formation of another city company being considered undesirable, after full investigation, it might possibly be looked upon with favour that an extension of the shipwrights' company would be appropriate, to embrace the marine engineer within the fold. The new premises of the Institute of Marine Engineers might thus form a suitable place for meetings.

CLYDE SHIPBUILDER ON LOST TIME.

ON the occasion of the launch on Nov. 12th, of H.M.S. *Benbow*, from the naval construction works of Messrs. William Beardmore & Co., Ltd., Dalmuir, the principal of that concern, in the course of remarks at the luncheon following the launch, gave a clear, moderate and well-reasoned deliverance on the subject of lost time in shipyards, which cannot too widely be made known. The keel of the *Benbow*, he said, was laid on May 30th last year, and she would have been launched long ere this had times been normal, but unfortunately the coal strike lasting some three or four months intervened and seriously delayed the progress of the work to begin with. Afterwards work becoming plentiful and men accordingly becoming scarce, it was very difficult to get sufficient labour to build the ship as rapidly as they desired. The result of this scarcity of labour was that wages had to be increased,

and he was sorry to say that this fact had the effect of very greatly delaying the building of the ship. Instead of the men working ordinary time and thus benefiting by the large increase in their wages—as one would naturally expect they would have done—they began to slacken off work and to put in very short time indeed. In looking into the time sheets of the yard he found that the lost time recorded on the part of their workers during the past year amounted to no less than 23 per cent. and to 28 per cent. in some cases, and this was not due to bad weather, as the past summer had been exceptionally dry. The average week was not much better than 41 hours, including any overtime that the men might have worked. In justification of what he said he would point out that the *Queen Elizabeth*, a battleship of the 1912-13 programme—that was a year later than the programme in which the *Benbow* was included—had actually been launched from the Portsmouth dockyard on the 16th of October, the reason being that the time kept in the Government dockyards had been much more regular than it had been on the Clyde. This short-sighted policy of the men made it very difficult, if not impossible, for a shipbuilder to carry on his business with anything like advantage, and he hoped that the workmen would give serious thought to his remarks, as they were made as much in their interests as his own.

INSTITUTE OF MARINE ENGINEERS.

Presidential Address and Presentation of Awards.

MR. THOMAS L. DEVITT delivered his presidential address before the Institute of Marine Engineers on November 3rd, afterwards presenting the Denny Gold Medal and other awards.

In the course of his address, Mr. Devitt said that, as a shipowner whose experience began in the days of the sailing ship, he looked back with some regret at its disappearance. He knew, however, that shipowners must move with the times or be left behind, and how essential it was for them to take advantage of every improvement and development for the propulsion of ships, and of every invention of the engineers, when proved to be sound, so that they might be able to hold their own in the severe competition for the world's traffic on the sea. Engineers, more than any others, depended upon the harmonious working of their machines, each part depending upon other parts, and if anything was out of order the whole construction might be at once made useless. He wished that this principle could be applied to the relations between employers and employed, so that there should be "no schism in the body." He was convinced that if this spirit could be encouraged, instead of setting class against class, and making trouble instead of harmonising difficulties, they would all prosper more than they did. None of them could do without the capitalist any more than they could do without the skilled workman. Working together with the aid of capital—shipowners, engineers, shipmasters and sailors generally could make a success.

Mr. Devitt then gave some interesting details of the developments in shipbuilding which had taken place during his experience. He said if he were asked to state the impression left upon him from these early recollections of the beginning of steam navigation, he would say that it was the spirit of enterprise that then existed among shipbuilders and engineers, the passion for experiment, the desire to tread unknown paths, to undertake projects the magnitude of which seemed out of all proportion to the means available for their execution. Then was the zenith of Thames shipbuilding. Mare's yard at Blackwall, afterwards the Thames Ironworks, was one of the principal yards of the world. The wages of the workmen at Blackwall averaged for eighteen months £5,000 per week and some weeks £1,600 more. The yards of Messrs. Green, Scott, Russell, Dudgeon, Maudslay, Samuda and many others employed thousands of hands.

The opening of the Suez Canal completely transformed the conditions of ocean transport and had since entirely reversed the proportion of sailing and steamer tonnage. The principal passenger lines which brought about this state of affairs were the P. & O. S. N. Co. and the Orient S. N. Co., with the latter of which he was connected. Since that time the science of marine engineering had never looked back. Even now, however, after the long experience of steam and the abandonment of the idea of auxiliary steam power in sailing vessels, there were sailing vessels being built of large capacity with Diesel engines to propel them in calms and adverse winds. They would hear before long whether these were a success or not.

He trusted that the new building, the corner stone of which was laid on October 29th by the Lord Mayor of London, would be the meeting place of many generations of engineers, where they could discuss their problems and help one another to perfect their machinery for the benefit of themselves and the world at large.

Denny Gold Medal.—The Denny Gold medal was then presented to Mr. James E. Milton (Member) for his paper on "The Spontaneous Combustion of Coal," read before the Institute on January 20th, 1913 (Session 1912-13).

Essay Competition Awards.—In connection with the Essay Competitions held during the session, the following awards were announced and presentations made:—*Associate Members.* In the competition for Associate Members, Mr. Walter Smith was awarded a prize to the value of £2 for his essay on "The Economic Use of Coal on board the Modern Steamship." *Graduates.* In the competition open to Graduates of the Institute, Mr. Jas. Marsden was awarded the prize of £2 for his paper on "The Safety Devices required in a Modern Boiler and Machinery Installation." *Open Competition.* In the open competition for the best essay on "The Welding of Iron: Past and Present Methods," the following awards were given:—£2 to Mr. Thos. E. Dodds (Graduate), £2 to Mr. Robt. J. Walker (Graduate), £1 to Mr. G. A. Murray Brown (Graduate), £1 to Mr. Wm. Auchinloss.

Lloyd's Register Scholarships.—It was announced that the Lloyd's Register Scholarship of the value of £50 per annum, tenable for two years, had been awarded to Mr. G. A. Murray Brown (Graduate), and premiums of £5 and £3 respectively were awarded by the Committee of Lloyd's Register to Mr. Thos. E. Dodds (Graduate) and Mr. Robt. J. Walker (Graduate).

The meeting closed with a vote of thanks to Mr. Devitt, on the proposal of Mr. Alexr. Boyle (Vice-President), seconded by Mr. R. Leslie, R.N.R. (Vice-President).

It has been announced that Sir Arch. Denny, Bart., has been nominated as President Elect for 1914-15, in succession to T. L. Devitt, Esq. The annual meeting is to be held on Thursday evening, February 26th, 1914.

INSTITUTE OF MARINE ENGINEERS.

Annual Dinner.

THE annual dinner of the Institute of Marine Engineers was held in the Hotel Cecil on November 21st, when the attendance exceeded that of any of its predecessors. The chair was occupied by the President, Mr. Thos. L. Devitt, and the following gentlemen were seated on his right and left :—Sir Archibald Denny, Bart., LL.D., G. Marconi, Esq., LL.D., D.Sc., the Hon. Peter McBride (Agent-General for Victoria), Captain A. W. Clarke (Trinity House), Captain Irizar (Argentine Naval Commission), George Uhler, Esq. (Board of Trade, U.S.A.), Homer T. Ferguson, Esq. (Newport News, U.S.A.), James Adamson, Esq. (Hon. Secretary), W. L. Hichens, Esq., John Dewrance, Esq., George J. Carter, Esq., C. Wray Palliser, Esq., Dr. R. T. Moore (Pres. Inst. of Engineers and Shipbuilders in Scotland), George L. King, Esq., Andrew Laing, Esq., Robt. Corry, Esq., D'Arcy M. Dawes, Esq., James H. Rosenthal, Esq., George T. Henderson, Esq., R. L. Forbes, Esq., P. W. Armour, Esq., W. Campbell Jones, Esq., J. A. Potter, Esq., F. Ritchie, Esq., Alexr. Boyle, Esq. (Board of Trade), L. B. Sebastian, Esq., J. Foster King, Esq. (British Corporation Registry), H. A. Wix, Esq., John Gravell, Esq. (Bureau Veritas), C. F. Redman, Esq. (Lloyd's Register), W. E. Archer, Esq., James Bain, Esq., Victor Wilkins, Esq., T. B. Lightfoot, Esq., Edmond J. Hill, Esq., Commander Montanaro, H. J. Ward, Esq. Summers Hunter, Esq. (Past Pres.), occupied the vice-chair.

The loyal toasts having been submitted and responded to by the assembly, "The Oversea Dominions, Shipping and Commerce" was proposed by Capt. A. W. Clarke in a speech, in which wit and humour were mingled with inspiring words and hopes. Referring to the oversea dominions, he gave a few descriptive sentences culled from his own experience of the verdure of Victoria, represented by Mr. Peter McBride, with whose name this part of the toast was coupled, and there was no gathering more appropriate than the present on which such a toast could be given for engineers ashore and afloat had done much to advance the great interests involved in it. The hospitality of friends and fellow countrymen in the oversea dominions was proverbial. The progress of shipping and commerce was sufficiently declared by the outstanding memorials in the city of London, a progress due to the energy and hard work of the men who had made shipping and commerce what it was, succeeded by those who now carried on the work ; a fitting representative of whom was in the chair to-night as the president of the Institute. The elements of the toast might be summed up in the triumvirate Power, Peace, Prosperity—a triple alliance to be maintained by all who had the interests and happiness of their country at heart.

Mr. Peter McBride responded and said that he esteemed it a privilege to be welcomed in such an assembly after only having recently arrived from what, he agreed with Captain Clarke, was as a garden ; Victoria was termed the cabbage patch, he did not consider the expression disdainful, as it showed the country was verdant. The Dominions looked to the mother country for emigrants who would maintain their country's high standard. Shipping and commerce had been brought to their present stage by the energy of those engaged in them, and it was due to the marine engineer that distances had been shortened in point of time; they were still being shortened, thus bringing the outer limits nearer the homeland. Mr. McBride made a touching reference to the death of Lady Strathcona, and a sympathetic reference to Lord Strathcona.

Sir Archd. Denny (President-elect) proposed "The Institute of Marine Engineers." Referring to the historical sketch of the Institute—published in our November issue—he pointed to the importance of the work carried on during the past twenty-four to twenty-five years since the inauguration, and looked forward to see the influence and importanee of the society increasingly felt in the new premises, at the ceremony of laying the foundation stone of which he had the satisfaction of being present. The Board of Trade returns showed the number of steamers occupied in the trade

Photo. Fradelle & Young.

Institute of Marine Engineers. Annual Dinner held November 21st, 1913.

of the country, and the number of marine engineers engaged in these ; by taking the figures represented in these returns there was a large area to call upon to increase the membership, which meantime only embraced about one-tenth of the whole. The Lloyd's scholarships and the Awards were excellent features of the work and for the two scholarships given by Lloyd's Register of Shipping their chairman might not emphasize sufficiently, in his modesty, and he took the opportunity of urging these upon their attention. Coupling the toast with the name of their President, and success to the Institute, Sir Archibald called for ringing cheers. The audience rose to the occasion and joined heartily in the ovation.

Mr Devitt, in acknowledgment, said the scholarships were given to encourage young men to acquire more knowledge and improve themselves to fit them for better positions than they might otherwise obtain. It was desirable to get the best out of everything and encourage improvement. The Institute had done well so far, and was progressing, the membership was increasing and ought to further increase, upholding its status and encouraging improvements.

" Kindred Institutions and The Guests," proposed by Mr. Geo. J. Carter, was responded to by Mr. G. Marconi, who was enthusiastically greeted, and by Dr. R. T. Moore (President, Inst. Engineers and Shipbnilders, Scotland). The concluding toast of the " Chairman " was proposed by Mr. John Dewrance and received with acclamation. The evening was an exceedingly pleasant one to all concerned.

STEERING AND MANŒUVRING OF SHIPS.

THE first thing that happens when the rudder of a vessel is put over is that she heels and slackens in speed. Leaving the latter effect to he treated later, we will now consider the heeling produced by turning. The total pressure (P, Fig. 1) of the water on the rudder acts at its centre of pressure (C.P.), which we can assume to be the centre of area of the immersed portion of the rudder. This pressure tends to force the stern of the vessel to one side, which movement is resisted by the water, the total resistance

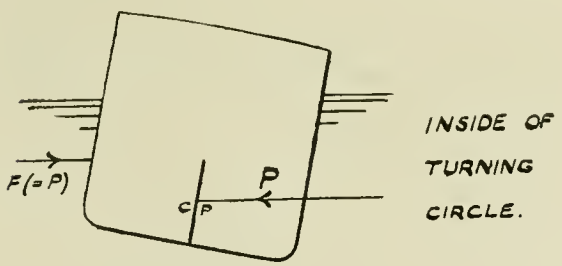


FIG 1.

thus offered being equivalent to a force F equal in magnitude and parallel to P, and acting at some distance above the centre of pressure of the rudder, thus combining with P to form a couple inclining the vessel toward the inside of the turning circle.

What has been said only applies to the heeling during the putting of the rudder hard over. When the vessel is swinging steadily in a circular path she will change her inclination and will now incline *outwards* from the centre of the turning circle, as, in addition to the above forces of pressure on rudder and resistance offered by the water to the swing of the stern, centrifugal force comes into play. This centrifugal force (C.F., Fig. 2) acts outwards from the centre of the turning circle through the centre of gravity (G) of the vessel, and it calls into existence another force (R) equal to it in magnitude. The latter force is the resistance offered by the water to the sideways movement of the vessel as a whole in the direction in which the centrifugal force acts. The resistance of the water acts at the centre of lateral resistance (C.L.R.) of the vessel, which point may be taken as coinciding with the centre of area of the submerged portion of

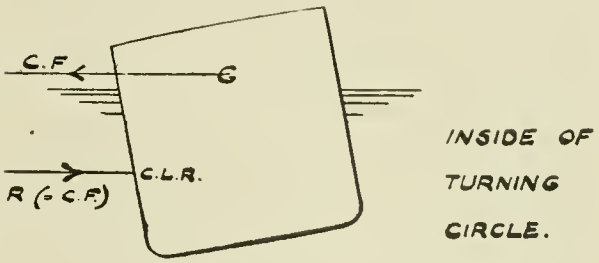


FIG. 2.

the middle-line plane of the vessel. The two parallel forces C.F. and R. act at some distance from one another, and constitute a couple which will incline the vessel towards the outside of the turning circle. It will be seen, however, that the out-turning couple due to the centrifugal force is acted against by the in-turning couple called into play by the pressure on the rudder, and so modified. If now the rudder be suddenly placed amidships, the in-turning couple is removed and that portion of the out-turning couple, which previously was cancelled, is now suddenly added to the unbalanced out-turning couple which originally existed, the result being an outward lurch which may be dangerous, and has even caused overturning in some cases.

The smaller the metacentric height of the vessel, the easier will it be to incline her at the small angles under consideration, so that we must expect a large outward heel angle when the metacentric height is small. This angle becomes greater also when the speed increases, indeed the angle increases as the square of the speed.

When the rudder is first put over, not only does the vessel heel, but her speed falls off. The slowing down is partly due to the resistance offered to her swinging movement by the water, and partly to the rudder being put over. The increase in resistance is due to several things ; the alteration in the stream-line formation round the vessel, which alteration is of such a nature as to call for work being done in deflecting the stream-lines. The formation of waves and eddies which drain energy from the vessel. The part the rudder plays in reducing the speed of the vessel is readily seen from Fig. 3, which represents the vessel in plan when cut down to the

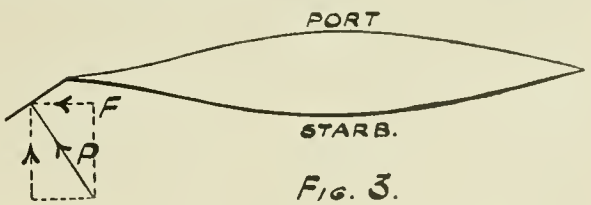


FIG. 3.

level of the water. The pressure P of the water on the rudder, can be resolved in two directions, one athwartships and one (F) fore and aft. As F is directly opposed to the motion of the vessel, then the pressure on the rudder reduces the vessel's speed. Up to the point of turning the effective thrust of the propeller was just equal to the resistance of the ship ; when the rudder is put over the additional resistance offered by the force already noted, together with the resistance due to the friction of the water on the rudder, drain energy from the vessel and slow her up.

When the rudder is put over at first, the vessel heels, as we have seen, and slackens in speed ; in addition to this she drifts sideways, as will readily be seen when we think of pushing the stern of a boat off a bank, the boat lying parallel to the bank originally. Not only will the boat turn about some centre well forward, but it will move bodily away from the bank.

The period occupied by the putting over of the helm is called the manœuvring period. After this we have what is known as the variable period, when the vessel is swinging with increasing angular velocity about a vertical axis through her centre of gravity, till the increasing resistance offered by the water to this swinging, together with the disinclination the vessel has to being swung, just balance the swing caused by the rudder, and set up a steady state of affairs. We then enter on the third and last stage, that of steady motion in a circular path ; this is called the steady period.

The helm takes some time to be put hard over, and this, together with the inertia of the vessel, or her unwillingness to adapt herself to altered conditions, results in a considerable angle being turned through before the vessel has settled into her new phase of motion. During this transitory state the path the vessel sweeps through is a spiral one, but when she has quite settled down, the rudder still being kept hard over, the path of turning is a portion of a circle, as might be expected. Before the path has become exactly circular the vessel will have swung through about 90 degrees. The distance from A (Fig. 4), the place where the helm is put over, to B, the place where she has moved through 90 degrees, is the advance, and the diameter of her path from position A to position C, that in which she has turned through 180 degrees, is the tactical diameter. The latter varies with

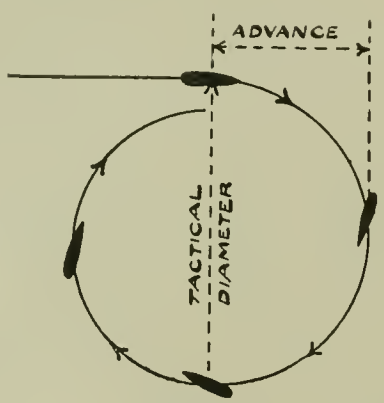


FIG. 4.

the trim of the vessel. If she trims more by the stern than she was designed for, then her tactical diameter will be greater than in normal conditions, if, on the other hand, she is down by the head, her tactical diameter will be reduced.

If we consider the vessel during the steady period we will find that she is not tangential to the turning circle, as might have been expected, but points towards the inside of that circle, as shown in Fig. 5. The centre of gravity (G) of the ship is on the turning circle, and the instantaneous motion of G is along GA, just as that of a train going round a curve is along a tangent to the curve—the direction in which the train would go were it to jump the lines. The angle between GA and the centre-line of the ship is the drift angle of G.

A point B well aft has an instantaneous motion BC, and if we resolve this along and at right angles to the centre-line of the vessel, we will get x, a motion of B towards port. Similarly, if we resolve the motion of a point D near the bow of the vessel in the same directions, we see that its movement is towards starboard. All points, then, aft of a certain spot have a motion to port, and all points forward of that spot have a motion to starboard. The spot itself has no motion in either direction, and if we were to stand there it would appear to us as if the vessel were swinging about that point. This is called the pivoting point and is denoted by P in the figure. There are cases, however, in which the pivoting point is beyond the stem of the vessel.

Certain things govern the turning of a ship. The turning will be slow if her under-water part offers great resistance to turning ; it is for this reason that some vessels, especially war vessels, are cut away aft, and also have a rising forefoot, though the cutting away aft has a greater effect than if the

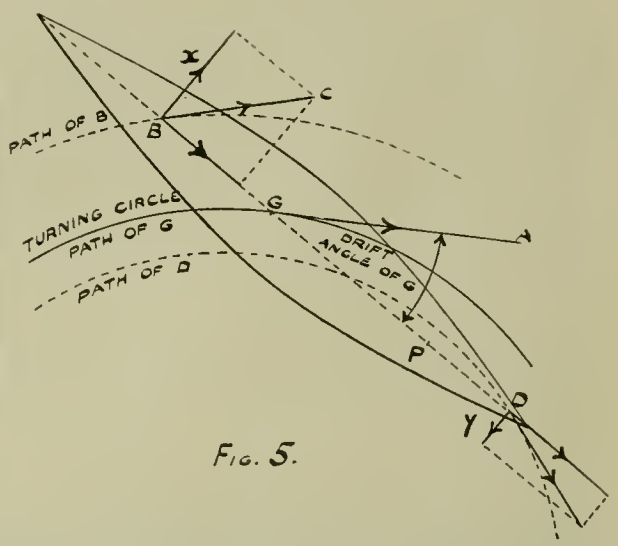


FIG. 5.

like be done forward, as the point about which the vessel turns is near the fore end of the vessel, so that as she swings the after part is travelling at a greater speed than the forward part, and so creates more resistance. Short vessels turn much more readily than long vessels, as their under-water portion does not resist turning to any great extent.

The moment of inertia of the vessel has a great effect on the turning. If the moment of inertia about a vertical axis through the pivoting point be great, then she will be difficult to turn, or, if turning, will be difficult to put again on the straight path. If the moment of inertia about this axis be small, then the reverse will be the case. The moment of inertia will be great or small according as the weights of the vessel are distributed towards her ends or are massed amidships.

With twin screws the turning of the vessel can be assisted by reversing one propeller ; if an accident should happen to the rudder, the vessel could be steered by varying the revolutions of the propellers independently.

SHIPPING, ENGINEERING AND MACHINERY EXHIBITION, 1914.—The Government of the Netherlands has appointed a Royal Commission for the purpose of organizing a collective exhibit of Dutch shipping (naval and mercantile marine), shipbuilding and engineering, at this exhibition. Among the members of the Commission are many of the most important business men in Holland.

CONDENSER TUBE CORROSION.—The work of the Institute of Metals Corrosion Committee during the next two years will include a complete time temperature survey of the conditions under which dezincification can take place and a more detailed study of the temperatures existing in condensers. Special attention will also be directed to the conditions under which electro-chemical protection can be effectively maintained, and in this connection a comparative study of all the principal methods of holding tubes in tube-plates will be carried out. A systematic series of experiments will also be initiated with a set of tubes of a copper-aluminium alloy from which specially interesting results are anticipated.

A PAPER was read before the Inst. of Civil Engineers on Nov. 11th by Mr. Francis Wentworth Shields, describing the construction of the White Star dock at Southampton. The new works consist of a tidal basin, in shape, a parallelogram about 1,700 ft. long and 400 ft. wide, opening direct on to the estuary of the river Test. The depth at l.w.o.s.t. is 40 ft., and at h.w.o.s.t. 53 ft. The works also include three quays facing on the river-channel just outside the basin, and a curved jetty which forms a guiding stage for ships entering or leaving the dock. The depth at the outside quays ranges from 25 to 35 ft. below l.w.o.s.t. The river-channel has been deepened to 35 ft. below l.w.o.s.t. to form an approach to the new basin and adjoining quays.

PROPULSION OF SHIPS.*

By the HON. SIR CHARLES PARSONS.

THE President, in the course of his remarks, said the general upshot of the discussion held in the previous session was that the case for the internal combustion engine, in its relation to ocean-going tramps, was not so strong as had been supposed, and that in the great majority of instances steam was much the cheaper propellant, having regard to the present prices of fuels and other charges. In the light of a further 12 months' experience there was no doubt that the discussion at that time was a work of great public utility. Last year he dealt with the causes of the difficulties of the large cylinder oil engine, and the case remained as it stood at that time. Dr. Hopkinson's method of internal cooling of the cylinder and valves by injection of water seemed to promise a possible solution, but had not yet been tried on a Diesel engine. Some of the leading makers on the Continent were, however, working on the lines of designing the cylinders, pistons and valves, in fact all parts subject to trouble from excessive heat, in such a way as to be easily and quickly replaced; but this remedy was only a partial one.

The progress of the internal combustion engine during the past year had been somewhat chequered. The annual report of Lloyd's Register stated that twelve ships were in commission and twenty-five building. He was informed by the secretary of Lloyd's Register that the powers were respectively 22,700 and 43,850, making a total of 66,550 b.h.p. classed under Lloyd's. The report was generally optimistic, but it seemed that the difficulties experienced with the large cylinder slow revolution Diesel engine had been greater than the report would suggest.

On the other hand, the adoption of the oil engine for smaller craft had undoubtedly met with great success, and had steadily increased. From data collected by Mr. Edwin Orde, it appeared that, omitting boats of under 100 ft. in length and excluding war vessels, the total number of vessels built and building with internal combustion engines was 152, with a total b.h.p. of 170,000. The date of the vessels' completion covered the period from 1903 to the present and onwards. It appeared that the average individual b.h.p. was tending to increase, but it should be observed that comparatively few vessels of over 1,000 h.p. had been more than one year in service, and that the majority of the vessels of larger power on order were not yet completed.

Last year he described the three systems of reduction gearing between the turbine and the propeller, the hydraulic transmitter of Dr. Föttinger, electrical gearing and mechanical gearing, and though gearing was not mentioned in the report of Lloyd's Register, rapid and considerable progress had been made during the year. Dr. Föttinger stated that the aggregate b.h.p. of his hydraulic gearing ordered within the last twelve months was about 100,000, including one liner of 20,000 h.p., one war vessel of 30,000 h.p., one cruiser of 45,000 h.p., and one excursion steamer of 6,000 h.p. The last had been delivered.

Electrical gearing had, however, made small progress. The United States collier *Jupiter*, referred to last year, so far as he was aware, had not completed her trials. Messrs. Swan, Hunter & Wigham Richardson had completed a cargo vessel 250 ft. in length, the propelling machinery consisting of two Mirrlees Diesel six-cylinder engines, each developing 300 b.h.p. at 400 r.p.m., and driving a Mavor and Coulson three-phase alternator, supplying current to a 500 b.h.p. Mavor and Coulson induction motor, which drove the screw shafting. The vessel, he understood, had completed her trials satisfactorily. In addition, in America several fire floats of about 800 h.p. had been equipped with electrical gear for working the propeller, fire pumps and other machinery.

Mechanical gearing had considerably extended in use during the year, and the horse-power on order or at work now exceeded 400,000 b.h.p. The vessels to which it was applied were of almost every class. In some cases the whole of the power was transmitted; in others the main turbines were directly connected, and the cruising turbines only were geared to the main shafting. It seemed probable that the use of geared turbines would continue to extend for all classes of ships, and that by its use considerable further economies would gradually be effected, more especially in conjunction with high degrees of superheat. Up to the present, no case of disablement of gear or indeed any material wear of the teeth had, he believed, occurred in any case.

Though superheating was not mentioned in the report of Lloyd's Register, yet it had quickly made great strides, and was now employed in the mercantile marine to the extent of upwards of 1,000,000 horse-power on the Schmidt system alone; nearly the whole was in conjunction with reciprocating engines. The saving in coal by its use was stated to amount to between ten and thirty per cent. The leading features of the Schmidt superheater appeared to be twofold. Firstly, and most important, was the placing of the superheater tubes in close proximity to a boiler surface, as in the case where a single convolution of superheater tube lay within the fire tube of the Scotch boiler, the great advantage being that the superheater tube was saved from burning and destruction by the rapidity of its radiation to the contiguous boiler surface. This very valuable feature seemed not to have been sufficiently recognised. The second important feature was that of high steam velocities, so as to scour out the tubes, and this was shared by many other superheaters, which were also giving excellent results. To judge from the steady progress of superheat on ships, it might safely be assumed that its use would extend further, and that a rate of fuel consumption per h.p. would be attained in large power installations more closely approximating to that of the internal combustion engine. The abnormally high speed of the propellers of Diesel-engined vessels involved a very considerable loss in propulsive efficiency as compared with steam-driven machinery, whether reciprocating or geared turbines, and that that difference might be of the order of ten per cent. to twenty per cent., depending on the stern lines of the vessel.

* Extracts from the Presidential Address delivered Oct. 31st, before the N.E.C. Inst. of Engineers and Shipbuilders, by Sir Charles Parsons, at the beginning of his second year as President.

THE INSTITUTE OF MARINE ENGINEERS' NEW PREMISES.

AS briefly stated in our last month's issue, in giving some particulars of the history of the Institute of Marine Engineers, the foundation stone of the new premises of the Institute was laid on October 29th, the late Lord Mayor of London performing the ceremony. Many well-known men in the shipping and engineering world were present at the function, which was a memorable event in the history of the Institute, and we are therefore pleased to be able to place before our readers reproductions of two photographs taken on the occasion. We have already published (September issue) an illustration of the building, showing how it will appear when finished, and on a future occasion we shall publish views of the accommodation. The architect is Mr. Victor Wilkins, of the Adelphi, and the members of the Executive Committee who were appointed by the Institute to look into the matter of City premises, and who recommended the site upon which the building is now being erected, are Mr. R. Leslie, R.N.R. (Chairman), Mr. J. T. Milton (Vice-Chairman), Mr. J. Hallett (Hon. Treasurer), Mr. A. H. Mather (Hon. Secretary), and Messrs. Geo. Adams, A. Boyle, J. Blackett, P. T. Campbell, J. McLaren and J. R. Rosenthal. The contractors are under agreement to complete the building by March 31st, 1914.

Mr. T. L. Devitt, in extending a hearty welcome to the Lord Mayor, stated that the Institute was formed some twenty-five years ago and had a present membership of between 1,400 and 1,500. Its members were connected with marine engineering all over the world, and some of the most distinguished engineers had belonged to it. The work of the Institute was most productive of usefulness to their own profession and to shipping in general, and he hoped that where they were then standing would be a centre of usefulness for marine engineers for generations to come.

The Lord Mayor said it gave him the greatest possible pleasure to be present that day. The Institute of Marine Engineers represented a very important industry. Its foundation was very much on the lines of the old livery guilds of the City of London. The certificate of membership must be of the greatest practical value, for it was a guarantee that a member was possessed of the necessary technical knowledge, and also was a man of integrity. He was pleased to note that the Institute had a loving care for the members who had fallen on evil days, and also helped the widows and orphans. He heartily wished every prosperity to the Institute in its new berth—in its new home.

Mr. James Denny, in briefly reviewing the history and work of the Institute, said that it was either just completing or was just on the eve of completing its semi-jubilee. About twenty-five years ago a small body of enthusiasts of the unpropitious number of thirteen met together and discussed what they believed to be a want of connection between marine engineers all over the world. They founded the Institute, and its success had justified their actions. He thought that the survivors of that gallant band must feel their cup of joy well-nigh running over when they looked to that day when the Institute was honoured by having as its president the chairman of Lloyd's Register, and the Lord Mayor to lay the foundation stone of their new home. The financial success of the Institute, though helped to a certain extent by friends outside the Institute proper, was due in great part to its own members. It might be asked why the marine engineers were so favoured, and the answer was that the marine engineer had served his employer and the public well. It would be very difficult to find any body of men upon whom so many calls had been made as the marine engineer. In his own time, which went back fifty years, they had changed from boiler pressures of 25 lbs. and simple engines to boiler pressures of 220 lbs. and quadruple engines, and more, this latter boiler pressure with superheaters, as he was reminded by his friend Mr. Summers Hunter. They had passed more or less from reciprocating engines to the rotary engine, better known as the turbine, and they were now changing over to the geared turbine. The oil engine, he thought, would become much more possible when the magnates who controlled the industry were prepared to sell their products at a reasonable rate. The training of marine engineers made real men of them. Most of them, he supposed, knew how Rudyard Kipling had sung of MacAndrew, and how he told the story of the great MacFee in a way, he thought, that made their hearts beat faster, and often brought tears of sympathy to their eyes. In this way the marine engineer had been almost immortalized.

At this stage the Lord Mayor performed the ceremony of the day, saying "I declare this stone well and truly laid."

Mr. T. L. Devitt, in proposing a hearty vote of thanks to the Lord Mayor for his presence, said that there were eighty City Guilds, and he was wondering whether the engineers should not have a livery company. A great many shipowners, friends of his, would be glad to be associated with such a guild. They might have a livery company connected with marine engineering, which might prove of immense value in the future for the profession and for the City of London.

Lord Inchcape seconded the resolution, and said they were greatly indebted to the Lord Mayor for his presence, and for what he had done for them that day.

Mr. Summers Hunter said that the work so well commenced that day must be very gratifying to the small but enterprising band who had brought it to such a successful issue. It would, he believed, help to spur on those who came after. He had great pleasure in supporting the resolution.

The vote of thanks was cordially agreed to, and the Lord Mayor suitably responded in a short speech, in which he said, if the work they had done that day was the result of the ability and devotion of thirteen men, who could say that there was anything unlucky in No. 13?

MESSRS. CROSBY, LOCKWOOD & SON have just issued a pocket lossary of technical terms for engineers and manufacturers, in English-German and German-English. It is well arranged, in alphabetical order, the English-German section being first. The book, which is of convenient pocket size, has been compiled by Mr. Joseph G. Horner, and translated into German by Mr. Otto Holtzmann. The price is 3/- nett.

(Photos, The Marine Engineer & Naval Architect).

INSTITUTE OF MARINE ENGINEERS' NEW PREMISES, TOWER HILL, E.C.

Foundation Stone Ceremony. The Stone was laid on October 29th by the Lord Mayor of London (Sir David Burnett), who was accompanied by the Sheriffs. The New Premises will be ready for occupation in April, 1914.

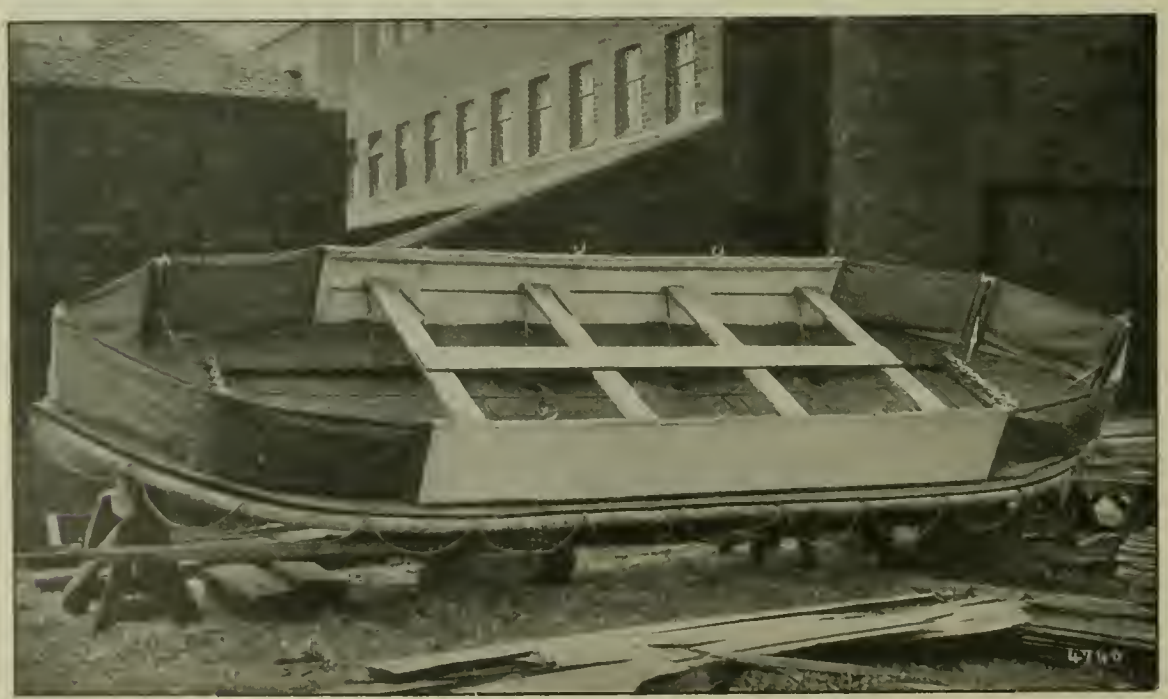
McLEAN'S DECKED LIFEBOAT.

THE abnormal, but in the circumstances very natural, interest in the problem of providing life-saving appliances at sea, following upon the ever-memorable and lamentable *Titanic* disaster is far from having exhausted itself, and may indeed be considered as having taken a fresh lease of life through the International Conference on Life-Saving at Sea, now going on in London. In all likelihood inventions and devices by the dozen or by the hundred will be submitted to the scrutiny and the deliberate consideration of the expert commission appointed in connection with the conference. Since the memorable *Titanic* disaster, various life-saving devices which have approved themselves in service for many years, as well as others which are comparatively new and untried, have been before the shipping public. A number of these indeed have been approved in ordinary daily service, and the demand for such has been so great that the firms providing the devices have found it quite impossible to meet the requirements in the time available. One of the newest and most approved forms of life-saving media is McLean's Patent Decked Lifeboat, which is herewith illustrated. This is the outcome of many years' experience in the building of the old "Chamber's" type of semi-collapsible lifeboat, and an embodiment of all the latest modifications and suggestions of the Marine Department of the Board of Trade, and of Messrs. McLean & Sons' long experience in the building of the ordinary type of ship's lifeboat. The McLean boat herself is an absolutely watertight and amply buoyant structure, sub-divided into many compartments by means of longitudinal and thwartship bulkheads, contributing strength as well as buoyancy. Stability is a feature in which the boat is especially noteworthy, and in tests made at Birkenhead in May, 1913, before a number of the Board of Trade officials and representatives of several notable shipping companies, the boat was found to be quite 30% more efficient in this respect than any of the other boats tested.

A distinctive feature of the McLean boat is a central sunk well, which contributes very largely towards the efficiency of the boat, and for which the following claims are made:—Large amount of reserve buoyancy. The Board of Trade freeboard measurement is taken at the lowest part of the sheer in the well, which means that the entire part of the boat above this represents reserve buoyancy in excess of Board of Trade requirements. The raised part of the boat surrounding the well is utilized as seating accommodation for the passengers, and thereby affords the maximum of shelter obtainable from bulwarks; a resultant low centre of gravity from the load; freedom of movement for the rowers, who alone occupy the thwarts. The sunk well also effectively concentrates all loose water on the deck space into the "relieving valves." These are of the pattern adopted in lifeboats of the Royal Naval Lifeboat Institution, six of which, 6 ins. in diameter, are fitted in the well of the boat, carrying the water into the sea.

A substantial wood bulwark is fitted on the boat and the minimum amount of canvas is employed, whereby a large saving in the subsequent upkeep of the boat is effected. At the same time a much more efficient shelter for the passengers is obtained, as well as an upperworks capable of effectually resisting the shocks and strain due to rowing the boat.

Another distinctive feature of the McLean boat is its adaptability for stowage. At a slight extra cost, permanent stowing chocks, which in no way affect the utility of the boat, can be fitted, whereby one boat can rest directly on the top of the other, just as they are



McLean's Patent Lifeboat.

received from the boatbuilder, thereby saving the expense of chocking usually borne by the shipowner and shipbuilder. The extreme overall depth of each boat is only 2′ 3″, and with two boats nested the extreme overall depth is only 4′ 6″. The boats are built in two sizes of 29′ × 8′ 9″, to carry fifty-one adults, and 30′ × 8′ 9″, to carry fifty-four adults, and they are built to the highest requirements of the Board of Trade authorities and certified by them to carry the above number of passengers. Amongst other large shipping companies who have adopted the "McLean" type of Decked Lifeboat, in preference to all others, is the Cunard S.S. Co., and it is fitted in large numbers to all the largest and latest ships of the Cunard Fleet.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

Fires in the Atlantic.

THE wreck of the *Volturno* kept afloat for a considerable time after her abandonment, and was sighted by several vessels. Eventually the steamship *Charlois*, from Sabine Pass for Amsterdam, came up with her in lat. 46·44 N. longitude 36·44 W. on the 17th October, and her master, considering the wreck a danger to navigation, sent a boat's crew aboard of her. They reported her as completely burnt out, and, having opened the valves of her injection, left her to sink. When they came up the ends of the vessel were still burning, and indeed every part seemed burnt out except the engine-room. A few relics, such as the ship's bell and a steam whistle, only were brought away. Still burning, the Johnston liner *Templemore* was towed into the Port of Boston, Mass., on the 20th October and beached by her salvor, the United States revenue cutter *Androscroggin*. The vessel had been abandoned in the Atlantic on the last day of September, so that she had been afloa tnearly three weeks without any one in charge. Three days after her entering Boston it was reported that her engines could be made serviceable again with comparatively little trouble and also that there remained about £10,000 worth of copper undamaged in her cargo. As, however, the fire was not finally extinguished till the 3rd November, this estimate must have been rather a premature one. Later it was said that all the tobacco and cotton were consumed, leaving about a hundred tons of iron bands amid the debris. Then it seemed to be the opinion that, save for the copper, there was nothing of value left and that the ship herself was only fit to scrap. But the fact that these two vessels, the *Templemore* and the *Volturno*, kept afloat so long after abandonment is in itself a matter of considerable interest.

Another fire at sea is that which broke out aboard the Spanish steamship *Balmes* of the Pinillos Line on Thursday, the 13th November, some six hundred miles east of Bermuda, when on a voyage from Havana to Cadiz. She sent off the S.O.S. signal and the same evening got in touch with the Cunard liner, *Pannonia*, which was then some 180 miles to the northward. As the *Carpathia* and the *Carmania* had done under similar circumstances, she made all speed towards the distressed ship and, reaching her about daybreak on the Friday, took off altogether some 103 passengers, mostly Spaniards. Finding that the *Balmes* was on fire in the forehold where a parcel of cotton was stowed, whilst there was also a considerable consignment of rum aboard, the master of the *Pannonia* decided that he had better stand by the burning ship, and, if possible, convoy her into Bermuda. This was accordingly done. The two ships arrived at Hamilton on the morning of the 16th November, and later in the same day the *Pannonia* with the rescued passengers and their baggage resumed her voyage to New York.

The P. and O. Company

announce that the names of two of the vessels now building for them at Birkenhead by Messrs. Cammell, Laird & Co. have been changed. That which was to have been known as the *Kandahar* will be known as the *Karmalah*, whilst the *Khorasan* will be the *Kalyan*. The reason for the change is probably the fact that Messrs. H. Fernie & Sons, of Liverpool, already have a *Khorazan*—a vessel of 3,285 tons, built on the Clyde in 1904, whilst a new *Kandahar* has recently been launched at Newcastle by Messrs. Swan, Hunter and Wigham Richardson for the Bucknall branch of the Ellerman Line.

Messrs. Alfred Holt & Co.

are making another new departure. This time they are operating with the firm of Messrs. Gellatly, Hankey & Co., so well known in the China and Japanese trades. The new service is to make departures from Hamburg and Antwerp in the North Sea, as well as from the British ports of Glasgow, Liverpool, Birkenhead and Swansea. The vessels are to trade at the Siberian ports of Vladivostock and, during the ice-free seasons, Nicolaieff. At first despatches —which will be taken alternately by the steamers of the two firms interested—will be made at four-weekly intervals. The first sailing will be taken by the Gellatly, Hankey liner *Pathan*, and for the next the Holt liner *Astyanax* is appointed. These vessels are modern steamships of approximately five thousand tons apiece.

The Anchor Line,

which has long had wireless on its Atlantic liners and on its larger Eastern vessels, now announces that installations are to be fitted on the remaining steamers of its Bombay service. The Argentine Government, by the way, has now joined those states which make wireless compulsory, a law having been passed which enacts that all ships entering or leaving Argentine ports with fifty or more persons aboard must have adequate wireless facilities in operation.

The Ice Danger in the Atlantic.

Another liner has suffered from collision with an iceberg, though fortunately without loss of life. This was the *Manchester Commerce*, homeward-bound from Montreal to Manchester. She reports that she struck an iceberg on Sunday, the 9th November, about 100 miles east of the Straits of Belle Isle. Her bows are said to be badly injured, being crushed back to the forward bulkhead. She is, however, safe at St. John's, Newfoundland, where repairs, which it is said will take fully two months, are to be executed. Her cargo, however, is believed to be undamaged.

The "Imperator,"

which is now withdrawn from the Atlantic for the much-talked-of overhaul, is not to go to the Gladstone Dock at Liverpool after all. International feeling seems—absurdly enough—to have been too strong for convenience, and so the work has been commenced at her native port of Hamburg. The shareholders of the Hamburg-America Line have now agreed to the proposals of their board whereby the capital of the Company is increased by about £1,150,000 sterling, making it total up to £9,000,000. The chairman of the meeting which sanctioned the increase, definitely informed the shareholders that the money was not required for a war chest, but was absolutely essential for the development of the Company's business. During the year just completed no less than £3,500,000 had been spent on new construction, and yet the fleet was inadequate to the needs of the Company, as a total of 124 voyages during the year had been carried out by chartered tonnage. Opportunity was taken to assure the shareholders that, in spite of attempts to make people believe the contrary, the *Imperator* had proved herself a success as a financial undertaking, whilst she had also secured herself in the favour of the travelling public.

The Mails from Queenstown.

The Cunard Liner *Mauretania*, which took the sailing of the 8th November from Liverpool, failed, owing to the prevalence of a strong south-easterly gale, to embark the Irish mails in the open sea off Queenstown on the morning of Sunday, the 9th November, and accordingly—as had been notified she would do under such circumstances—went away to the westward without them. Thus there were left for the next mail a total of 916 sacks of mails and six packages of parcel-post matter. The Queenstown people alleged that, the gale notwithstanding, it would have been quite safe for the liner's commander to have taken her into the harbour to embark the mails, had he so minded, since they allege that the tide was favourable for such a

course on his part. But the fact remains that Cunard's did what they said they would do.

The Pacific Mail Company

according to a rumour persistently circulated on the Stock Exchange at the beginning of November, may possibly be absorbed by the Hamburg -America Line. It is well known that the great German company is making considerable plans to get a hold on the new trades which will be opened up by the completion of the Panama Canal, and are especially developing services to Northern Pacific ports in conjunction with Messrs. J. H. Welsford & Co., of Liverpool. Should they be able to secure this powerful local business, they would be in a good position to demand their share of the good things which are so confidently expected. It should not, however, be forgotten that if the provision of the waterway materially shortens so many voyages, it will to that extent increase the working power of the existing tonnage of the world and therefore in some measure tend to depress freights.

The Compagnie Generale Transatlantique

has followed up the acquisition of their successful mail steamer the *France*, by laying the keel of another and larger steamship for the New York Mail service. This vessel is the *Paris*, of 37,000 tons gross register. Her first keel plate was laid by the Minister of Marine at St. Nazaire at the beginning of November. This vessel's speed is to be moderate as speeds go to-day—not exceeding, say, 22 knots. She will be about 750 ft. long and 82 ft. beam, and will have accommodation, all told, for 3,200 passengers.

Mr. A. A. Booth,

chairman of the Cunard Company, read an interesting paper on the shipowner's business to the students of Newcastle a few weeks ago. One matter with which he dealt was of great interest. He told of the genesis of his Company's *Aquitania*. They wanted a vessel which should be able to run in the three weekly round with the *Mauretania* and *Lusitania*, but as she would not have the Government subsidy, she could not have their speed. Yet to get round in the time she would have to do 23 knots at sea. Her speed was thus fixed at that. Then she had by a combination of diminished expenses and increased earnings to show a better return than the older steamers by some £5,000 a voyage to make up for the absence of the subsidy. That meant that they would have to carry passengers on seven decks. To give her stability to carry these decks she had to have the length, beam and depth with which we find her. But her designed beam was now such that docking accommodation for her was lacking, and so she could not get beyond the paper stage till the Mersey Docks and Harbour Board agreed with the Cunard Company to provide the Gladstone Dock. All this figuring and negotiation took up a full year before she could be placed with the builders at Clydebank.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

THE annual inspection of the establishments here was carried out at the end of October, the *Enchantress*, with Mr. Winston Churchill, the First Lord, arriving on Sunday, October 26th, after the long cruise to the north, where he had been visiting the Government bases and private building yards. The other representatives of the Admiralty came down from town on Monday, and on that and the following day made a very thorough inspection of all the departments. They naturally had a long look at the *Queen Elizabeth*, which since her launch has been taken under the big cantilever crane which is to be used to lift her armour-plates in place and to put her machinery, etc., on board. Their lordships also, in the course of their tour of the yard, visited No. 14 dock, which is in process of being lengthened and widened so that it may be able to take in any Dreadnought. With "C" lock and its sister, which is in process of completion, Portsmouth should be very well off for "Dreadnought" docks soon. Altogether, the authorities appeared to be very well pleased with the shaping of the work here. Mr. Churchill stayed on several days after his colleagues had returned to town. He made visits to the submarine establishment at Haslar and to the aviation school at Calshot, as well as motoring to Farnborough, also in connection, it is said, with naval aircraft work. During his stay, he made another trip in submarine *D* 2, and has shown special interest in the underwater and air departments. Among other places he visited were the new magazines for high explosives which have been placed on Bedenham Marshes, a desolate and out-of-the-way place, far out of the town, in case of accident. These buildings, which were taken over by the authorities recently, are to have the most elaborate measures taken for their protection. Orders have now been received in the yard to discontinue night shifts and overtime, an arrangement which has not altogether been received with favour, especially as the refits of ships have still to be completed in twenty-four days' working time. In future also the destroyers of the First Fleet Flotillas are to be commissioned at their respective ports by divisions, and the dates of commissioning are to coincide with the dates of refit. This new arrangement is to come into working at once, and should bring a rather larger batch of boats than usual in hand at the same time. The workmen in most of the departments are already considering the new petitions concerning their grievances, which are to be sent to the Admiralty. Although considerable concessions have been made recently, most of them find that they want more pay, or have other matters which are in need of settlement, and are framing their requests accordingly. At the same time, the extension of the established list, which has taken place, has created a large feeling of satisfaction. In addition to smaller numbers for the ordnance, victualling and works departments, 283 men are to be added to the yard this year and 330 next. There is a fair amount of work in hand, although some surprise has been expressed that the *Royal Sovereign* is not yet to be laid down, seeing that the plans and a good deal of her material have already been received. The trials of the *Iron Duke*, which was launched just over twelve months ago, have been begun, and on November 12th, almost on the same day that she was reported ready for her tests, Captain the Hon. Herbert A'Court was appointed to command her for them. The *Ariadne*, cruiser, is being prepared to take the place of the *Spartiate* as a training ship for stokers, and the *Spartiate* is to be fitted as a tender to the *Ganges* at Harwich, where she will be used as a training ship in signals and wireless for the boys at Shotley. The *Argonaut* is to take the place of the *Highflyer* next year as a training ship for the special entry cadets. A tablet has been recently placed in the dockyard church to the memory of Lieut. P. O'Brien, who was drowned when in command of Submarine *B* 2 on the occasion of the sinking of that vessel off Dover on October 4th, 1912.

Devonport Dockyard.

Mr. Churchill paid another "flying visit" to this yard in the first week of November, arriving in the Admiralty yacht *Enchantress*, after witnessing the firing tests with the obsolete battleship *Empress of India* as a target. The First Lord was accompanied by his Naval Secretary, Rear-Admiral de Chair, and by the First Sea Lord, and in the short time they were here the party visited several ships, both built and building. They boarded the new battleship *Ajax*, which was brought up to full complement at this yard on October 31st and has now joined the Second Battle Squadron; the *Centurion* which has had director-firing appliances fitted to her 4-in. armament and has since left to carry our experiments therewith; the *Conqueror*, another Devonport battleship of the same squadron as the *Ajax* and *Centurion*; and the *Colossus*, of which Rear-Admiral de Chair was the first captain. Of greater interest, no doubt, was the light cruiser *Highflyer*, which the visitors also inspected. This is the vessel in which the cadets entered from public schools and elsewhere at the age of eighteen are undergoing their preliminary training. Mr. Churchill not only went all over the ship, looking into the cadets' quarters and workshops, etc., and seeing them at their work, but he also saw them mustered, and even inspected the arrangements for their meals. The *Highflyer* so far has only made week-end visits to Dartmouth, similar to the trips which the *Eclipse* used to make when attached to Osborne College, to give the cadets opportunities of developing their sea legs. A week before the Admiralty visit there was

an exodus of ships in connection with the cruise of Vice-Admiral Colville to the Mediterranean, as of the thirteen battleships and cruisers which accompanied him, nine are attached to this port for stores and manning. They are to return in time for Christmas, before which they will have gone as far as Port Said, and as meetings with the French Fleet have been arranged both at Toulon and at the Piræus, the cruise should prove interesting to the officers and men. The extension of the established list has caused no small gratification, although at the time of writing there is only the promise and not the performance. It is expected that about two hundred and fifty more men will be established this year as compared with last, and that an even larger number will be placed on the establishment next year These figures will include a proportion of employees in the Works Department, which is admitted for the first time, and the advantages consequent upon establishment, which include eligibility for pensions and for the Imperial Service medal, will be much appreciated by these men. What was after all a trivial incident has now been settled by the issue of an Admiralty order relating to the provision of brows or gangways for warships alongside the royal dockyards. As mentioned last month, a workman employed in refitting the *Bellerophon* entered the ship, not for the first time, by a brow reserved for officers, and on being placed under observation by a sergeant of marines until he could be reported to a dockyard inspector, his fellow workmen held a protest meeting against the "indignity and humiliation of being placed under an armed escort," and demanded an inquiry. The new Admiralty regulations which the incident has called forth simply uphold the authority of commanding officers of ships over the use of brows to their vessels, whether in dock or basin, but the Captain of the Dockyard, if for ships in basins, or the Constructive Manager, if for ships in docks, is directed, not only to supply such brows as are demanded by officers, but also boards indicating by whom they are to be used. The launch of the *Warspite* on November 26th is almost upon us at the moment of writing, and this event will practically mark the termination of the period of Vice-Admiral R. H. S. Stokes as Admiral-Superintendent. His successor has not yet been officially nominated.

Chatham Dockyard.

There was a large assemblage in the yard on Saturday, October 25th, to witness the floating out of the *Arethusa*. The weather was all that could be desired, and the ceremony was attended with complete success. The *Arethusa* is the second vessel of the new class of light armoured cruisers to take the water. She burns only oil in her furnaces, and is to fulfil the function of a flagship of destroyers—indeed, will be a destroyer of destroyers herself. The occasion was in every way a popular one, for Mr. Macnamara, whose wife named the ship, is a general favourite, while both the Superintendent of the yard, Admiral Anson, and Mrs. Anson, are regarded with the kindliest feelings by all with whom they have come in contact. The top note on the proceeding was put by the Financial Secretary when he called for three cheers "for the men who built the ship." Mr. Hammond's painting of the *Arethusa*, which was presented to Mrs. Macnamara as a souvenir of the occasion, and also the carved casket containing the mallet and chisel, the work of Messrs. Rogers and Paulton, have been much admired. Five days later, without so much ceremony, submarine *E* 8 was launched, making the twelfth submarine built in the yard. Chatham feels somewhat elated because within a month it has put into the water three ships—not, indeed, so big as those which have been launched further to the westward, but enough to demonstrate that the establishment can do construction as well as repair work. Another sign of the renewed importance of the eastern yard is to be found in the consideration which the authorities are now giving to the question of housing accommodation, owing to the increased numbers of men who are being employed in the neighbourhood. There is, however, some apprehension felt lest the work upon which these men are engaged should only prove to be of a temporary character, and this feeling militates against any large outlay on building development at present. Meantime, the addition to the establishment of two hundred and twenty-nine men this year, with a promise of two hundred and sixty-four more during the financial year 1914-15, has given a good deal of satisfaction. The bulk of the increase affects the constructive staff, but it also concerns the ordnance and stores departments. Two questions are being discussed at the present time by the men. One concerns the preparation of the annual petitions, the other that of making up time so as to permit of longer holidays at Christmas and on similar occasions. The principle has been conceded, and it is thought it might well be extended. There is no more certain sign of the change of seasons than that afforded by the surveying ships, which come in this month to lay up for the winter. The *Triton* reduced her crew on November 1st, and since then the *Endeavour*, with the tenders *Esther* and *Daisy*, also of the North Sea survey, have followed routine and reduced to winter complements. The men are getting an extra seven days' leave, which is not too much when the arduous nature of the work in which they have been engaged is considered. The *London* has left after her refit to rejoin the Fifth Battle Squadron, and the *Vanguard* arrived here on November 12th for annual overhaul. She will next month go into the floating dock for under-water examination. While the *Leviathan* is refitting here, the *Sutlej* is to take her place in the Sixth Cruiser Squadron. The crew of the *Diamond* was brought up to active numbers on November 7th for service in the Fifth Battle Squadron as attached cruiser. Twelve of the "L" class of destroyers are to be allotted to this yard for commissioning purposes, and the *Laertes*, late *Sarpedon*, has been commissioned here for the new Third Destroyer Flotilla, of which she is the first unit. Five of the "M" class are to come here for commissioning purposes also, the *Mentor*, *Mansfield*, *Murray*, *Myngs*, and *Matchless*. The depot-ship *Tyne* has arrived for her annual refit.

Sheerness Dockyard.

The month of December will witness two flag changes in the squadrons attached to the Nore. On the 5th, Vice-Admiral Sir Frederick Hamilton completes two years in command of the Second and Third Fleets, and his successor is to be Vice-Admiral Sir Cecil Burney, who has recently been serving as Governor of Scutari, for his service in which capacity and at the blockade of the Montenegrin coast the King has conferred upon him the K.C.M.G. A change is also pending in the post of Rear-Admiral in the Home Fleets at the Nore, in which Rear-Admiral Charles Dundas of Dundas completed two years on November 2nd, although he was permitted to remain on until Vice-Admiral Hamilton's flag was hauled down. He is to be succeeded, according to report, by Rear-Admiral Stuart Nicholson. There has also been a change in the appointment of Chief Constructor at this yard. Mr. W. G. Cole, from Gibraltar, taking up duty on November 15th, in succession to Mr. W. T. Hockaday, who has gone to Devonport. In the first week of November, there were some exciting scenes here in connection with the mobilization of the shore defences in order to give the troops in Sheerness Garrison practice in defending the approaches to the Medway. Two attempts were made by torpedo craft to enter the harbour at night unobserved, but neither was successful. The submarines, which also took part, seem to have had better luck, for they claim to have torpedoed one of the Fifth Squadron battleships in the port. The air station on the Isle of Grain lent several seaplanes, which also co-operated, and one of them became disabled at sea and had to be taken back on a destroyer. An awkward mishap also occurred to Submarine *C* 7, which came to the surface between the barge *Runic* and its mooring chain, fouling the latter, but no great damage was done. From such comments as have been made on these experiments, it would seem that the task of the destroyer will be harder in future than it has been hitherto, now that aeroplanes can be used by the defenders, and with the progress of the submarine it is not surprising that fewer destroyers are being built. The departure of the Third Flotilla for the Mediterranean has reduced the activity of the port somewhat, but the first boat of the new Third Flotilla has arrived, and others will shortly follow. The First Lord paid us a visit of several days at the end of October in the *Enchantress*, and that he was impressed by what he saw, particularly by his flights in machines of the Flying Corps, both airships and seaplanes, is clear from his speech at the Mansion House a few days afterwards. The *Thalia* has been ordered to be prepared as a hulk for service at the new base at Cromarty.

Pembroke Dockyard.

The *Trefoil* is now afloat, her launch having taken place on October 27th, and the first ship of the Royal Navy (apart from submarines) to be driven by internal combustion machinery is therefore in the water. She is not the first of the six new oil-carriers to be put afloat, as the *Carol* was launched at Devonport in July, but that vessel is not to be driven by internal combustion motors of the Diesel type, as is the *Trefoil*. The idea of the Admiralty has been to adopt various kinds of propelling machinery in these six oil-carrying vessels, and they will thus form an experimental squadron whose operations on service will provide valuable data for future use. Mrs. E. J. Maginness, the wife of the Chief Constructor at Pembroke, named the *Trefoil*, and Captain A. E. A. Grant, the superintendent, and Mrs. Grant, were among those present. The new ship will have a displacement of 4,000 tons, with a length of 300 ft., beam of 39 ft., and draught of 18 ft., her carrying capacity being 2,000 tons. The Diesel engines, of 1,500 h.p., are being manufactured by the Vickers Company at Barrow. Not much time was lost in beginning the *Turmoil*, the second oil-carrier allotted for construction here, for her keel plate was laid on November 3rd. She will not be so long as the *Trefoil*, but will have the same carrying capacity. The contract for her internal combustion engines has been given to Messrs. White, of Cowes, and it is stated that her speed will be 12 knots an hour. As regards cruiser construction, steady progress can be reported, the *Nottingham* being nearly ready for her trials, and the *Cordelia* being well advanced on the stocks, while material is coming to hand for the *Carysfort*, shortly to be laid down. The destroyers *Thorn* and *Leopard* are refitting, and the conversion of the *Heliopolis* into a hospital ship to be called the *Mediator* also gives employment to several hands. From a labour standpoint, the event of the month has been the announcement of an increase in the established list, in accordance with the requests put forward by the workmen. There will be fifty-five men added to the establishment by March next, and sixty in the next financial year, and these present and prospective additions have been well received. The men do not mind taking a little less in their wages each week if they can be put on the establishment, for they are more than recompensed by the privileges which come to them as established servants of the Crown.

MOTOR SHIP FOR THE HAMBURG-AMERICA COMPANY.

A New Junkers-Weser Engined Vessel of 2000 H.P.

FEW vessels are awaited with greater interest by the shipping and marine engineering world than the *Priemus*, which should shortly be running her official trials, because she is installed with the first large marine Diesel engines of the Junkers-Weser type, about which so much discussion has been raised, due to the design being a distinct departure from existing marine Diesel motors. This ship has been built to the order of the Hamburg-America Co., who already own the Burmeister and Wain four-stroke engined Diesel ship *Christian X.*, that they purchased from the East Asiatic Co., about a year ago, but the difference in the machinery of the two vessels is very great.

The *Priemus* has been designed and built by the Weser Co., while the machinery was constructed in conjunction with Professor Junkers. She is a vessel of 6,000 tons deadweight capacity, with the following leading dimensions:—Length overall, 353 ft.; extreme beam, 50 ft.; moulded depth, 26 ft.; draught (loaded), 22½ ft.; total power, 2,000 b.h.p.; speed, 10 knots.

One of the troubles that has been met with in connection with Diesel motors in service is that of cracked cylinder heads, due in part to the fact of the orifices necessary for the various valves causing unequal expansion and contraction stresses when the cylinder gets hot or cold, as the case may be; also to the varying pressures to which this part is subjected, and this results in cracked covers. With the Junkers' designs the cylinders have open ends, being practically tubes, and to each cylinder there are two pistons, which on the combustion stroke are driven apart from each other. Being simple castings with no forces to transmit, the cylinders are free to expand, as their duty is merely to act as combustion chambers and combustion-tight guides for the pistons. At one end the pistons are always in contact with the atmosphere, and with every outward stroke they come to rest in well cooled parts of the cylinders, thus facilitating cooling, which is carried out by water, a telescopic device being adopted. By admitting lubricating oil into the cylinder at points where it cannot be overheated by the heat of the exhaust gases efficient lubrication is as assured.

Previous to entering to marine work Professor Junkers had much experience with horizontal land-type oil engines of this system, some being of 1,000 h.p. He is so confident in the high powers that it ultimately will be possible to produce, when more experience has been obtained, that he has designed a 23-knot battleship of 26,000 tons to be fitted with twelve Junkers-Weser two-cylinder double-acting (tandem) Diesel engines, developing a total of 45,000 h.p. at 150 revolutions per minute. Each cylinder is to have a bore of 890 mm. by 2 m. 600 mm. stroke.

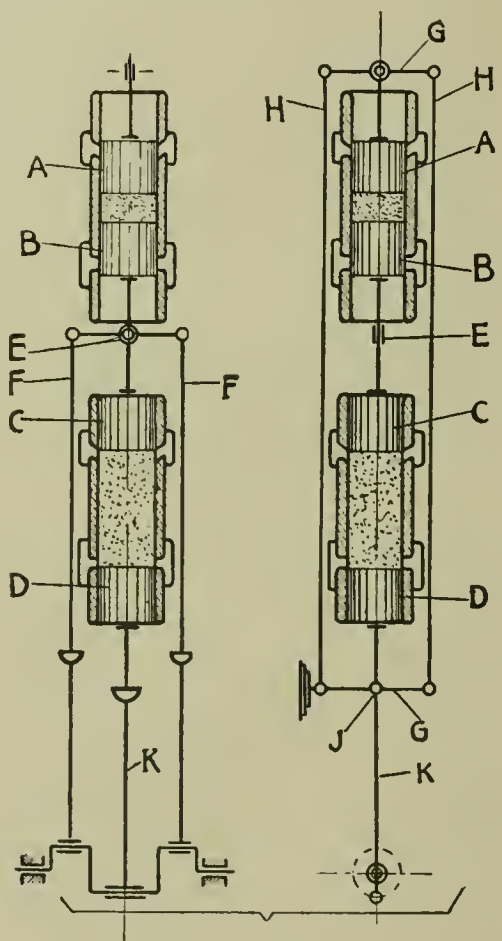


Fig. 1. Side Elevation.

Fig. 2. End Elevation.

To give a simple explanation of the principle on which the Weser-Junkers engine operates reference to the illustrations Figs. 1 and 2 should be made. It will be seen from Fig. 1 that there are four pistons per cylinder, the latter being divined into two cylinders. When the pistons (A) and (B) are coming together on the compression stroke pistons (C) and (D) are travelling apart on the combustion stroke, and *vice versa*. This is arranged by connecting the lower piston (B) of the top cylinder with the upper piston (C) of the bottom cylinder at (E), connection from this point to the crankshaft being by the short horizontal lever (E) and the vertical rods (F). The top piston (A) of the upper cylinder is connected with the bottom piston (D) of the lower cylinder by means of the short horizontal levers (G) and the vertical

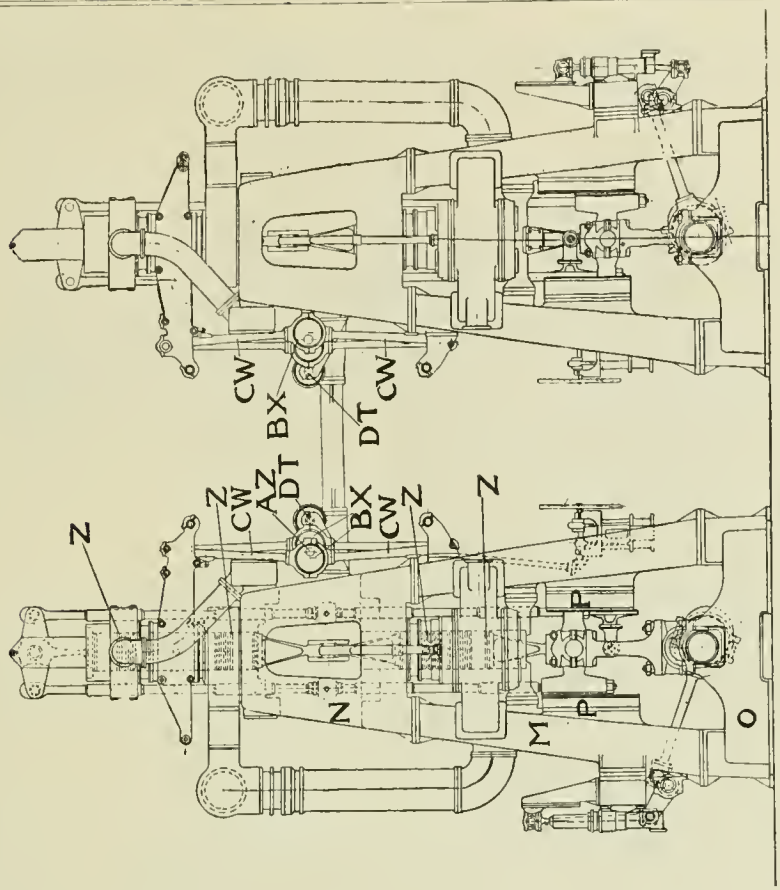
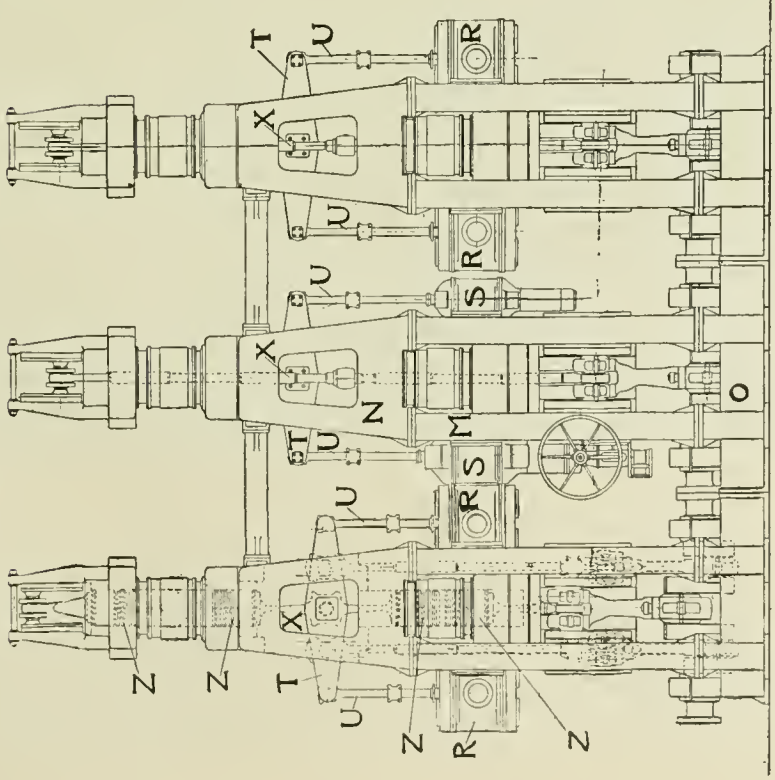
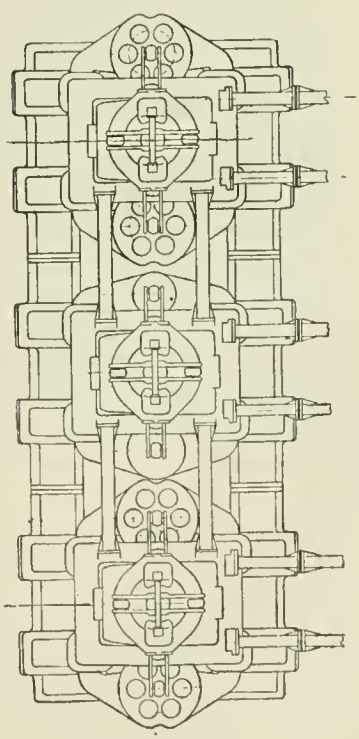
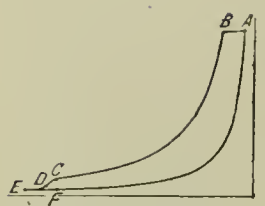


Figure 8.

A New Junkers-Weser Marine Engine built by the Weser Coy., for the Hamburg-America Co.'s *Priemus*.







Indicator Diagram.

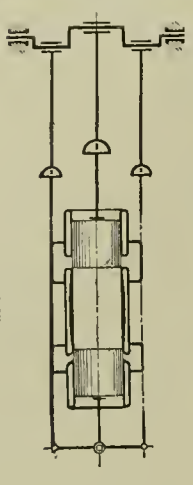


Fig. 3.

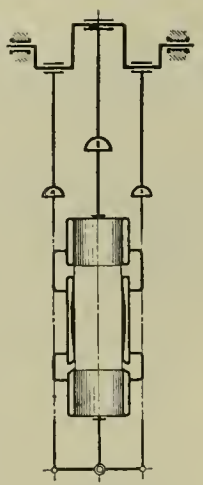


Fig. 4.

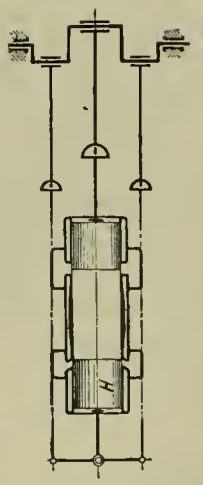


Fig. 5.

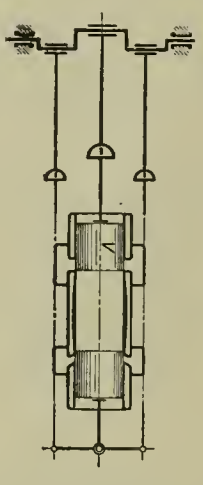


Fig. 6.

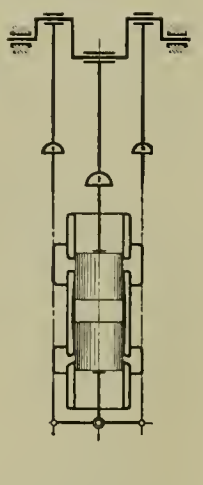


Fig. 7.

rods (H). These rods (H) are joined to the central connection rod (K) while the other rods (F) are attached to the two outer connecting rods, so for the four pistons there are three connecting rods, and the rods (F) and (H) are arranged at right angles to one another, otherwise one set would interfere with the working of the other set. Fig. 1 represents a front view of a section of the engine and Fig. 2 an end view. The complete engine would show in a general view three sets of Fig. 1, so there are altogether three sets of tandem cylinders with a total of twelve pistons, as will be seen by Fig. 8.

In order to better follow the cycle of power developing operations we now turn to Figs. 3-7, and for the purpose of simple explanation we will illustrate the lower set of pistons of one cylinder only. The working of the upper set of pistons is exactly the same, but they work alternately with the lower ones. In Fig. 3 the atmospheric air has just been compressed between the pistons, the fuel injected and fired, while Fig. 4 illustrates the position towards the completion of the combustion stroke. In Fig. 5 the exhaust ports are opening, but the scavenging ports in the top of the cylinders are still closed. The exhaust gases pass out and their movement is accelerated by the opening of the scavenging ports as shown in Fig. 6. The cylinders are then filled with pure air and the pistons commence to close again on the compression stroke, as illustrated in Fig. 7. Thus it will already be understood that no scavenging valves with their intricate mechanism is required. We say intricate because with most Diesel engines it means that an extra set of cams with their manœuvring gear are required to operate the various valves when reversing. With the Junkers design manœuvring is greatly simplified as only the fuel injection, and air starting valves need mechanical adjustment, the ports automatically coming right with the direction of rotation of the motor. The only other engines that approach the simplicity of this arrangement are the Sulzer and the Polar designs.

The little indicator diagram illustrates the cycle of operations. A to B is the injection of fuel and the expansion of the products caused by combustion, and B to C the gradual falling off of power, while C to D is the position in which the equalizing of the cylinder pressure with that of the atmosphere has approximately taken place, and D.E.F. is the scavenging period. The compressing of the pure air, which causes high temperature, is illustrated by F to A.

Theoretically this engine should be more efficient for its weight and length than any other type of Diesel, particularly as it is practically a double-acting motor; but its greatest drawback is probably to be found in its great height, which is caused by the tandem cylinder arrangement. Whether or not this will make any difference can hardly be told until the *Priemus* has accomplished at least one ocean-going voyage under severe conditions. Another feature that offers itself for criticism is that the transmission of power from the piston lies through so many rods and levers, instead of being direct to the crankshaft by short connecting rods. The lower piston of each bottom cylinder is the only one that has a direct connection, and curiously enough it is fitted with a cross head and guide; but the latter probably is to take up any strains imposed by the long rods from the top piston of the upper cylinder. But it will be realized that it is difficult to forecast what effects a rough voyage would have upon the transmission rods and levers, and we should not be surprised if some difficulty and accidents were encountered in this direction. Still, it is not fair to be too critical considering these are the first two engines of their type, and that the builders are thus unable to incorporate any marine experience. So if they are mildly successful there should be a great future for the Weser-Junkers Diesel engine.

Turning to Fig. 8 and 9 it will be seen that these represent one of the actual completed engines of the *Priemus*, and from these the design hardly seems so formidable. As beforementioned, there are three pairs of cylinders per engine, each pair being arranged in tandem, The bore is 400 mm. (16 in.) by 400 mm. stroke and 1,000 b.h.p. is developed, we understand, at 120 revolutions per minute. Its overall length is 23½ ft. with 9 ft. depth, and a height of 27½ ft. For the support of the cylinders there are the cast-iron columns (M) and the frame (N), which in turn are bolted to the bedplate (O); but from the height of the engine we should say that a little more "spread" of the columns would overcome any tendency to sway with the engine at work during bad weather. To these columns are secured the guide surfaces (P) for the piston rods. For each outer set of tandem cylinders there are a pair of double-acting scavenging pumps (R), the latter having a bore of 28 in. by 16 in. stroke, while the central set of cylinders is fitted with a pair of double-acting air compressors (S). In each case the pumps and compressors are actuated by means of the cross-levers (T) and the rods (U) from the rod (X) that connects the bottom piston of the top cylinder with the upper piston of the lower cylinder. The four pistons per cylinder are shown at Z.

For fuel injection there are two valves per cylinder and these are set in such a position that the fuel sweeps round the walls of the combustion chambers, thus giving excellent distribution. For operating the various valves there are a series of eccentrics (AZ) on the camshaft (BX), these displacing the cams generally employed for the purpose, and from the eccentrics the motion is transmitted to the valves by the rods (CW), and so the same eccentrics are utilized for both the upper and lower cylinders. The camshaft is actuated by means of a vertical rod and bevel gearing from the crankshaft. Reversing is carried out by operating the horizontal shaft (DT), by compressed air or hand, and the turning of this shaft brings the valve lever rollers into the correct position for ahead or astern running as the case may be. It will appear from the foregoing that while the design, if taken on the whole, has much to commend it, considerable modifications will have to be made in certain of the main features before it is likely to appeal to shipowners in general.

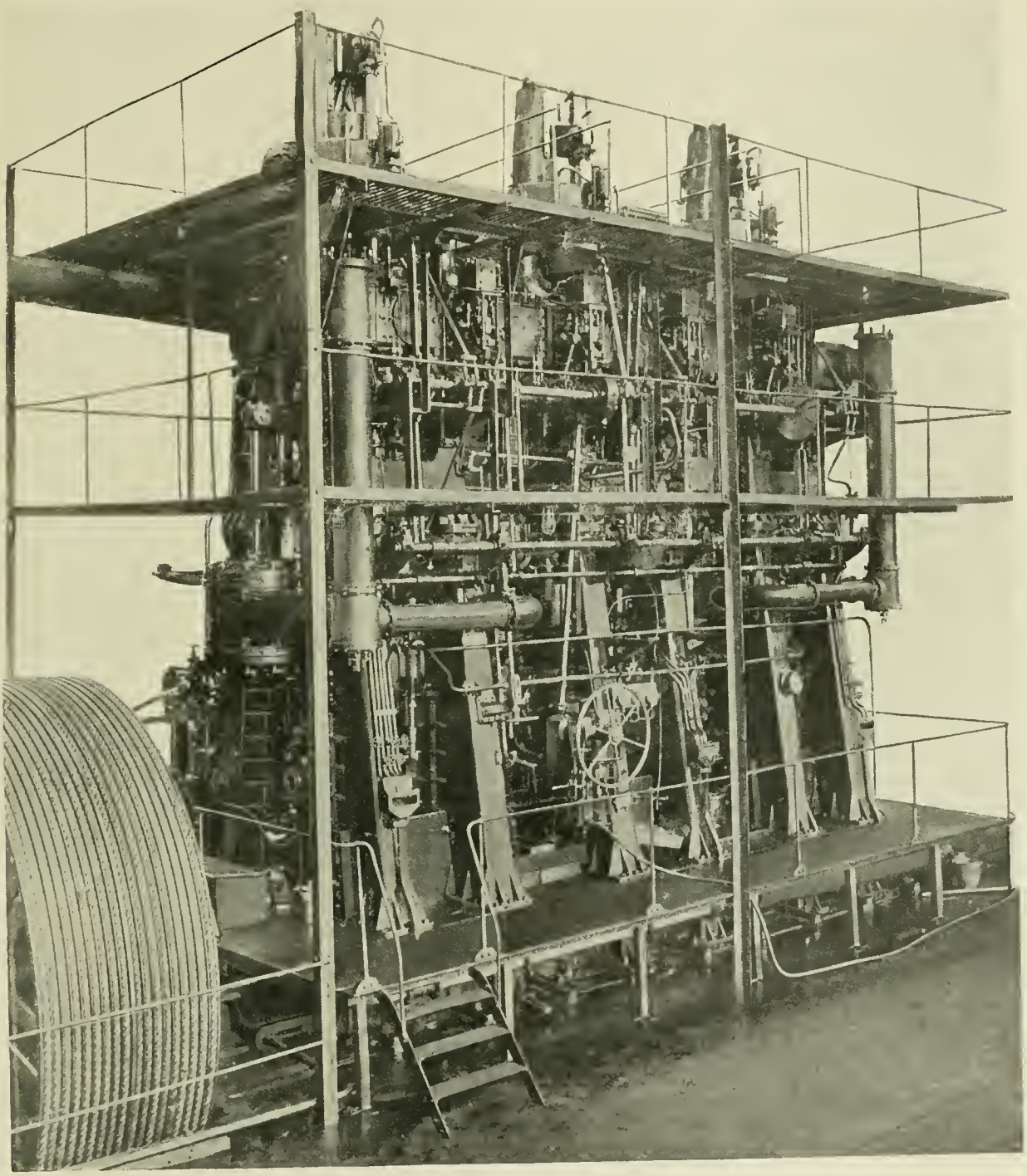


Fig. 9.—Junkers-Weser Marine Diesel Engine for the Hamburg-America Co.'s *Priemus*.

THE OFFICIAL ENQUIRY into the circumstances connected with the casualty to the s.s. *Volturno*, of London, including the loss of life that occurred, opened 26th November, at Caxton Hall, Westminster, London, S.W.

WE are informed that Mr. Axel Welin, the inventor of the well-known davit, was appointed a delegate on the International Conference for safety of life at sea, but in view of his intimate connection with inventions and the financial interests involved, he deemed it inexpedient to act—and therefore felt it incumbent upon him to decline the appointment.

IN connection with the preliminary work of the foundation of the Australian capital city Canberra, there is at present a good deal of activity being displayed, and the Department of Home Affairs of the Commonwealth in Melbourne has issued specifications and conditions of contract for the water supply pumping plant at Canberra, tenders for which close on the 26th November. Copies of the plans and specifications may be seen at the offices of the High Commissioner for the Commonwealth of Australia, 72, Victoria Street, London, S.W.

SAFETY OF LIFE AT SEA.

International Conference.

THE International Conference on the Safety of Life at Sea was opened at the Foreign Office, on November 12th, by Mr. Sydney Buxton, President of the Board of Trade, who delivered an address of welcome to the delegates on behalf of His Majesty's Government. The Press was not admitted, but a full official report of the proceedings was issued. During his address, Mr. Buxton said there were important problems connected with both the passenger vessels making short voyages and with cargo ships, which deserved full and careful consideration, but in order to keep the scope of the Conference within reasonable limits, it would appear advisable that, generally speaking, the attention of the Conference should be specially directed to safety of life on ocean-going passenger steamers, and the questions to be discussed, he thought, might be broadly divided into five heads, as follows:—

FIRST.—Was it possible by constructional arrangements to decrease or to eliminate the liability to founder? He had in mind more especially bulkheads and watertight compartments.

SECONDLY.—In the event of collision, fire or other accident, what apparatus and machinery were required to minimize the disaster and to save the lives of those involved? This head covered the provision of boats and their accessories, and of other life-saving appliances, of fire-extinguishing appliances, and other apparatus, into the details of which he need not enter.

THIRDLY (and equally important).—What were the best arrangements to ensure the organized use of these life-saving appliances, so that they could be most effectively, coolly and expeditiously handled on board the ship herself, and on board a rescuing ship as well?

FOURTHLY.—How could aid and assistance from another ship, or from the shore, be most quickly and effectively invoked and obtained? Under this head he especially had in mind wireless telegraphy—a question of vital importance.

FINALLY.—What measures, apart from the vessel itself, could be taken to diminish or avert the likelihood of accident? Under this heading came the observation of ice in the North Atlantic, the patrol of the ice regions in those waters, the observation and reporting of derelicts, storms and fog signals and warnings, etc.

He expressed the hope that an agreement would be arrived at by the Conference, and that full effect would be given at the earliest possible moment to the resolutions adopted, and when the Conference had separated it would rest with each of the Governments represented to give effect to the acts of the Conference so far as its own vessels were concerned.

Dr. Von Koerner, the chief German delegate, said that in Germany His Majesty the Emperor was the first to suggest the idea of an International Conference, with a view of drawing conclusions from the fate of the *Titanic*.

Lord Mersey, president of the Conference, said:—The aims which the Conference had in view were simple and plain. They were to secure the safety of our fellow men in the great international passenger traffic of the world, and to lay down the rules with which steamers must comply as a condition to carrying on that traffic. Compliance with the rules would, under agreed conditions, entitle steamers to the grant of certificates, and these certificates would be recognised by the different states who may sign the Convention which would follow on the conclusion of the deliberations of the Conference. It was not possible to carry on the great international passenger trade without some risk; all that could be done was to strive to reduce that risk to a minimum. In doing that, however, regard must be had to two considerations. The means taken must not be such as to prevent the reasonable handling of the vessel, nor should they be of such an extravagant kind as to destroy the trade. In short, the practical requirements of business must always be borne in mind. Perfection could sometimes be reached at too great a cost. But while remembering these two considerations, he would suggest that, where doubt existed, the tendency should always lean towards the line of safety rather than towards the line of economy. Increased cost incurred in the true interest of safety would be cheerfully met by the public, and they, after all, were those who had to pay. The means to be adopted to attain the ends in view had already occupied the serious and anxious attention of some of the ablest marine experts of this country, and the results of their labours had been, or would be, laid before the Conference.

The members of the Conference were subsequently entertained to a luncheon at the Foreign Office.

The names of the delegates appointed to represent the British Government are as follows:—

The LORD MERSEY, late President of the Admiralty Division of the High Court, and President of the Court of Inquiry into the loss of the s.s. *Titanic*.
Mr. E. G. MOGGRIDGE, Assistant Secretary to the Marine Department, Board of Trade.
Captain A. H. F. YOUNG, Professional Officer to the Marine Department, Board of Trade.
Mr. C. HIPWOOD, Marine Department of the Board of Trade.
Mr. W. D. ARCHER, Principal Ship Surveyor to the Board of Trade.
Sir ARCHIBALD DENNY, Bart., Chairman of the Departmental Committee on Bulkheads and Watertight Compartments.
Sir NORMAN HILL, Chairman of the Merchant Shipping Advisory Committee.
Sir JOHN BILES, Chairman of the Departmental Committee on Boats and Davits.
Captain ACTON BLAKE, Deputy Master of the Trinity House.

The delegates will be assisted by the following expert assessors:—

Commander F. G. LORING, R.N., General Post Office.
Commander M. W. CAMPBELL HEPWORTH, C.B., R.D., R.N.R., Meteorological Office.
Commander J. T. W. CHARLES, C.B., R.D., R.N.R.
Mr. J. HAVELOCK WILSON.

The Secretaries-General to the Conference are Mr. J. A. Webster, Board of Trade, and Mr. G. Locock, Foreign Office. Assistant Secretaries: Mr. F. P. Robinson, Mr. T. Lodge, Mr. N. Carter and Mr. H. Leak. Attached to the Secretaries: Mr. G. H. E. Parr.

The representatives of foreign countries are:—

GERMANY.—H.E. Dr. von Koerner, Dr. Seliger, Herr Schutt, Dr. Riess, Professor Pagel, Herr Schrader, Rear-Admiral Behm. Assistant delegates: Captain Schmaltz, Herr Walter, Herr Polis, Herr E. Gribel; secretary, Herr Voelkner; attached to the delegation, Herr von Bulow.

UNITED STATES.—Hon. J. W. Alexander, Hon. T. E. Burton, Hon. E. T. Chamberlain, Commander E. P. Bertolf, Rear-Admiral Washington L. Capps, Captain G. F. Cooper, Dr. Homer L. Ferguson, Mr. A. G. Smith, Mr. Andrew Furuseth, Captain W. H. G. Bullard, Mr. George Uhler; consulting expert, Mr. McBride.

AUSTRIA-HUNGARY.—Baron G. de Franckenstein.

AUSTRIA.—Dr. P. Schreckenthal, M. Pierre Fragiacomo, M. Wilhelm Palm.

HUNGARY.—M. Ladislas Dunay, M. Andor Steinacker, M. Etienne Machay.

BELGIUM.—M. E. A. Pierrard, M. Ch. le Jeune, M. L. Franck; assistant delegate, M. J. de Ruelle; secretaries, Commander A. Bultinck, M. J. Hostie, M. E. Bogaert; assistant secretary, M. R. Capelle.

SPAIN.—Captain Rafael Bausâ; secretary, Captain Don Eliseo Sauchiz.

FRANCE.—M. Guernier, M. Tréfeu, Comte Amiral Journet, M. Boris, M. Fronin; consulting experts, M. Grolous, M. Berthe de Berthe, M. Gérand, Capitaine Brenot.

ITALY.—Grande Ufficiale Commendatore Carlo Bruno, Commendatore Vittorio Ripa di Meana, Cavaliere Ufficiale Gustavo Tosti, Commendatore Giovanni Battista Veroggio, Cavaliere Filippo Bonfiglietti, Count Carlo Rey

di Villarey, Nobile Guglielmo di Palma Castiglione, Commendatore Michele Fileti, Signor Domenico Barricelli; secretary, Cavaliere Pier Luigi Fiore.

NETHERLANDS.—M. J. V. Werdsma, M. H. S. G. Maas, M. A. D. Muller, M. J. Wilmink; secretary, M. J. W. C. Coops; consulting experts, Professor Vossnack, M. H. J. Nierstrasz, M. P. H. Gallé.

RUSSIA.—M. Roman Mikhailovitch Loviaguin.

DENMARK.—M. A. H. M. Rasmussen, M. Emil Krogh, M. Host, M. Topsoe Jensen; secretary, M. Axel Helper.

NORWAY.—M. H. Pedersen, Dr. Johannes Bruhn, M. Jens Evang.

SWEDEN.—Vice-Admiral Olsen, G.C.V.O., M. W. R. B. Lundgren, M. E. Loefgren, M. N. G. Nilsson.

CANADA.—Mr. Alexander Johnston; consulting experts, Mr. Frank McDonnell, Mr. Charles F. M. Duguid, Major H. M. Kersey, D.S.O.

AUSTRALIA.—Captain R. M. Collins, C.M.G.

NEW ZEALAND.—The Hon. Thomas Mackenzie

Delegates, assessors and others attending the Conference number over 100.

It was stated by Lord Mersey that each member of the Conference would be at liberty to use the language which he found best suited for expressing what he wished to say, but it would be convenient that general discussion should be conducted in French or English, and that the findings of the Conference should take their final form in the French language.

A Dinner in connection with the Conference was held on November 18th, at the Savoy Hotel, presided over by The Right Hon. Sydney Buxton, President of the Board of Trade. There was a large and representative gathering composed of Government representatives, Delegates from the Maritime Nations, Members of Committees, and representatives of those whose interests are deeply concerned in the work of the Conference, Shipowners and Marine Engineers. It was a very pleasant and successful gathering.

After the loyal toast presented by the President, the Lord Chancellor submitted "The International Maritime Conference on the Safety of Life at Sea." He reviewed briefly the discoveries of the men of science, one or more of whom, each of the Nations represented had produced, and whose work had been given to the world, for the benefit of humanity, resulting in improved conditions of life. The man of Science in one Nation thus gave to all and for all, and tended to draw a circle of common sympathy around humanity. One object of the Conference was to call together those who could bring their knowledge and science to bear upon a subject in which all were at one in desire and effort—the benefits aimed at were humanitarian. The sea was being used more and more by travellers, and it was important to all that the results of the deliberations of the experts should be to render safety on the sea more and more assured. Such was a universal wish, the accomplishment of it was a desire of all nations, uniting them towards one another, and not only so but helping forward the time which might be yet far distant, when many of the undesirable and barbaric elements met with to-day shall be eliminated, and a deeper sense of the wants and claims of humanity will be manifested throughout the world.

The Hon. J. W. Alexander, representing America responded and referred in appreciative terms to the reception accorded to members appointed to attend the conference and gave several interesting points in connection with American Shipping. Baron Georges de Franckenstein representing Austria-Hungary and Commendatore Carlo Bruno, representing Italy also responded. The remainder of the evening was spent by the guests in conversation and interchanging greetings.

The question of load line will be considered by a separate conference which will meet next year.

FOREIGN NOTES.

Austria.

THE *Nimrod* has been delivered to her owners, Messrs. Gerolornich, who have placed an order with the Stabilimento Tecnico Triestino, San Marco, for the building of another vessel of the same type and size, *i.e.*, with 9,600 d.w. tons capacity, and of the following dimensions :—430 ft. by 54 ft. by 32 ft. 6 in. She will be built to the 100 A1 class of Lloyd's and the highest class of Austrian Veritas, special survey. The engines will be supplied by Messrs. Kincaid & Co., of Greenock, and will be of the triple-expansion type. The contract speed is 12 knots.

The Cantiere Navale Triestino of Monfalcone have received an order for the construction of four light armoured cruisers for the Chinese Government. The same yard has just delivered to the Austro-Americana, Trieste, a new large tugboat, 117 ft. by 20 ft. by 12 ft., engined with the first engine (of triple-expansion type and developing about 700 h.p. on 12 knots) built in the yard's workshops. This is the fifty-third vessel built at the yard and all delivered in six years. Cantiere Navale Triestino started their first vessel in 1907. The cargo steamer *Dora*, of 11,000 tons, has just been launched at the Cantiere Navale Triestino at Triest, where she has been built to the order of the Austro-Americana Co. She will be completed at the earliest moment.

France.

The cargo and passenger steamer *Lutetia* has just been successfully put through her trial runs, when she attained a speed of 20·87 knots, being somewhat in excess of the contract speed. The engines, which worked well, consist of three triple-expansion sets, each of which is in connection with a low-pressure Parsons turbine, and develop 14,500 i.h.p. The length of the *Lutetia* is 182·7 m. with a beam of 19·52 m., draught 7 m., with a displacement of 15,000 tons. The *Lutetia* has accommodation for 300 passengers of first class, 106 second class, 80 of third and 600 of fourth class. She is equipped with the most modern requirements to secure the comfort and safety of all on board. The cargo steamer *Henriette*, of 3,100 tons carrying capacity, has just been successfully launched at the Chantiers de la Loire at Havre. Her speed will be 10·7 knots. The cargo and passenger steamer *Flandre*, of 11,330 tons displacement, was successfully put into the water at the Chantiers de l'Atlantique, where she has been built to the order of the Antilles Line. Length 146·4 m., draught 7·2 m. Two quadruple engines and two low-pressure turbines and six boilers with 14 kilos working pressure will give the *Flandre* a speed of 18·5 knots. The Government has purchased the motor tank steamer *Lucellum* from Messrs. Moss & Co., for the price of 3,200,000 francs, and the ship has been re-named the *Garonne*. Her carrying capacity is 7,000 tons.

Germany.

The North German Lloyd has the following steamers in course of construction in German shipyards :—Passenger liner, 35,000 registered tons, 28,000 h.p.; two passenger and cargo steamers of respectively 35,000 registered tons, 28,000 h.p., and 18,000 registered tons, 16,000 h.p.; eight cargo steamers, each of 6,600 registered tons, 4,000 h.p.; four cargo steamers, each of 8,000 registered tons, 4,400 h.p.; one steam tender, 800 registered tons, 1,300 h.p.

The German Hansa Steamship Co. at Bremen has placed an order for two cargo steamers of 11,500 tons carrying capacity and of 3,600 i.h.p. with the Tecklenborg Shipyard at Bremerhaven. The Hansa Co. has also placed an order with the Flensburg Shipyard for a cargo steamer of 10,000 tons carrying capacity. The Hamburg-America Line has placed an order for two cargo and passenger steamers of 12,000 tons carrying capacity for the East Indian service with the Vulcan Works at Stettin. The Tecklenborg Shipyard has secured an order for a cargo steamer of 13,300 tons carrying capacity from the Kosmos Steamship Co. at Hamburg. The Neptune Shipyard at Rostock has also secured an order for a cargo steamer of 5,600 tons carrying capacity from the German Levant Line, which has also placed a similar order with the Nordsee Works at Emden.

The cargo and passenger steamer *Cannstadt* has just been successfully launched. She has been built to the order of

the German-Australian Steamship Co. at the Flenstung Shipyard, Hamburg, for the Australian service. The *Cannstadt* has a carrying capacity of 10,000 tons and has an ample equipment of boats and commodious passenger and crew space. The Hamburg-America Line has placed orders for the two new mail steamers for the new mail service from Germany to the Far East with the Vulcan Shipyard at Bremen on a new method of payment. No settled price has been agreed on. The shipyard credits itself with the cost, to which a suitable addition is made for working expenses and depreciation, and it will be paid a fixed percentage to represent the profit on the order mentioned. This ensures the shipyard securing a suitable profit.

The cargo steamer *Luxor* has been launched from the Tecklenborg Shipyard at Bremerhaven. The owning company is the Kosmos Steamship Co., Hamburg. The vessel has a length of 149 m., beam 18·5 m., and a carrying capacity of 12,200 tons. A triple-expansion engine of 3,800 i.h.p. is fitted, and the speed will be 12 knots. The Hamburg-America Line has bought a cargo steamer of 9,400 tons in course of construction for a Hamburg shipping firm and the vessel will now be completed for the Hamburg-America Line. The Imperial Shipyard at Wilhelmshaven will shortly be supplied with a very large floating crane which is now in course of construction. Its lifting capacity will be 250 tons.

It is stated that the Hamburg-America Line has asked Messrs. Cramp & Sons, of Philadelphia, to estimate for the construction of three passenger steamers of about 152 m. in length and 18 knots speed, with accommodation for 500 cabin and 1,700 between-deck passengers. These steamers are intended for traffic between the Atlantic and Pacific Oceans through the Panama Canal. The passenger steamer *Mark*, built to the order of the North German Lloyd, has been launched at the Vulcan Shipyard at Bremen. Her length is 149·35 m., beam 17·98 m. and on 8·15 m. draught her carrying capacity is 11,000 tons. A triple-expansion engine of 4,500 i.h.p. will give her a speed of 12½ knots. The *Mark* is intended for the Australian service.

Roumania.

A new naval base is to be established at Mangalia, in a bay near the Black Sea, large enough to accommodate a large fleet of vessels.

Russia.

It is stated that an English financial group intend erecting an extensive shipyard near the port of Nikolajew, and that already orders have been secured for the construction of a number of steamers. It is also intended to lay down a large rolling mill for the purpose of manufacturing the greater part of the required material.

Sweden.

The Nordstiarnan (Johnson Line) Steamship Co. has placed a further order for three motor vessels of 6,600 tons for delivery in May, 1914 and 1915, with the Burmeister and Wain Shipyard at Copenhagen, for service to South America. These motor vessels will be chiefly employed for cargo purposes.

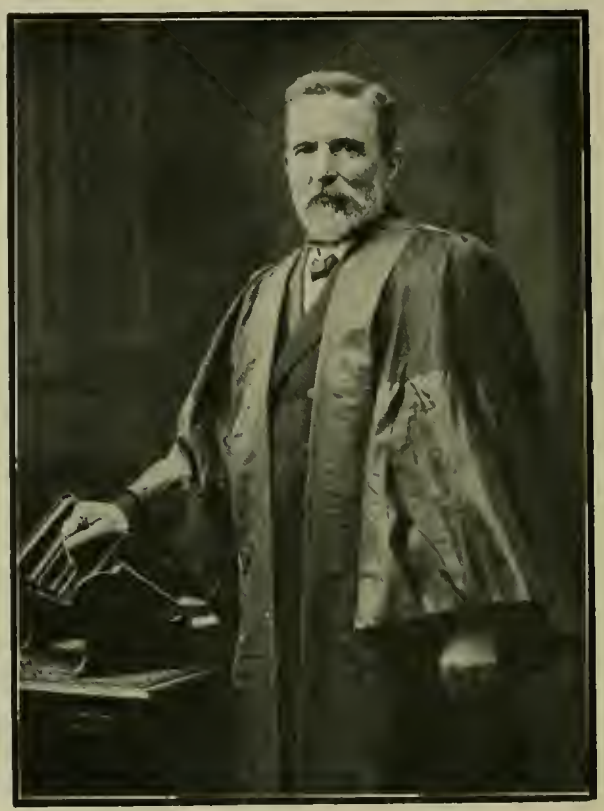
U.S.A.

Orders for six destroyers, Nos. 57 to 62, have been given out, one with the Fore River Shipbuilding Co., two with the New York Shipbuilding Co., one with the Bath Ironworks and two with the firm of Messrs. Cramp & Sons. They will be fitted with turbines and oil fuel will be used.

OBITUARY.

Dr. Samuel J. P. Thearle.

IT is with great regret we have to record the death of Dr. Samuel J. P. Thearle, which took place on November 12th at his residence at South Croydon. As the chief ship surveyor to Lloyd's Register, Dr. Thearle was naturally very widely known, and his death is a serious loss to the shipbuilding industry. Brought up in Devonport Dockyard as a shipyard apprentice, he left the service of the Admiralty in 1876, when he joined Lloyd's Register as a surveyor and was employed in that capacity in London, Bristol, Greenock and Glasgow. In 1898 he was appointed to the position of principal surveyor on the Tyne, and in 1900, when his predecessor, Mr. H. J. Cornish, was promoted to the chief surveyorship of Lloyd's Register on the retirement of the late Mr. Benjamin Martell, Mr. Thearle, as he then was, came to London from the Tyne as Mr. Cornish's assistant. On Mr. Cornish's retirement in 1909 he was appointed to the position he occupied at the time of his death. A man of a charming disposition, who always extended the greatest accessibility to those who wanted to have his assistance or



Dr. S. J. P. Thearle.

co-operation, he made numerous friends in all the business associations or organizations with which he naturally came into contact in the conduct of his duties. He was a member of the Departmental Committee on Bulkheads and Watertight Compartments, and on that of the Load Line. He was the author of a number of books dealing with shipbuilding and contributed papers to the Institution of Naval Architects and the North-East Coast Institution. His last illness was a short one, and his death at sixty-eight years of age was unexpected by his friends. He leaves a widow and three daughters to mourn his loss.

Alexander Craig.

We regret to have to put on record the death on Nov. 8th of Mr. Alexander Craig, consulting and superintending engineer, 113, St. Vincent Street, Glasgow. Mr. Craig, who was only forty-five years of age, had been at business up till a few days previous to his death, this event following upon an operation. He was a son of Mr. John Craig, shipowner, Glasgow. In early life he served his apprenticeship as a shipbuilder and engineer, and was at sea for a number of years, during which he qualified as chief engineer. He was engaged for a time with Messrs. A. R. Brown, McFarlane and Co., consulting engineers, and afterwards he commenced business on his own account as a consulting marine engineer. He was surveyor in Glasgow for the Germanischer Lloyd International Register for the classification of shipping.

James Howden.

On the eve of going to press with this issue we have learned with deep regret of the death of Mr. James Howden, the well-known engineer of Glasgow—chairman of Messrs. James Howden & Co., Ltd., Scotland Street—and this regret, we feel sure will be common throughout marine engineering and shipping circles everywhere. His death took place on Friday, November 21st, at a nursing home in Glasgow, to which a few days previously he had been removed from his residence in Prince's Terrace, Dowanhill, to undergo, under more favourable conditions, a serious operation.

Throughout a long and strenuous life of close on 82 years the name of Mr. Howden has been prominently associated with various departures and advances in the evolution of marine propulsion and more particularly during later years with the introduction of forced draught in the working of marine boilers. Of late also the restless spirit of advance, and the prolific flow of inventive idea, which have all along actuated and distinguished him, have taken the line of devising and manufacturing machinery required in great industrial enterprises on land.

Mr. Howden was born at Prestonpans, Haddingtonshire, in 1832, and received his early education there. While still a youth he went to Glasgow and in 1847 became an apprentice in the works of Messrs. James Gray & Co., Washington Street, a firm then celebrated for the production of factory and blowing engines. On the completion of his apprenticeship—in 1853—he entered the office of Messrs. Bell & Miller, civil engineers, Glasgow, and after serving with that firm for nine months he accepted an appointment with Mr. Robert Griffiths, well-known for his work in connection with screw propellers; in which domain of marine engineering Mr. Howden afterwards also distinguished himself. In 1854 Mr. Howden, then in his 22nd year, started in business for himself, having even thus early patented various machines and appliances connected with engineering and boiler making. His first contract for marine engines was made in 1859 with Messrs. Henderson, of the Anchor Line. This was for compound engines and water tube boilers of his own design, using steam at 100 lbs. pressure—a very decided advance on the ruling practice of single-cylinder engines using steam of only from 20-lbs. to 25-lbs. pressure.

In 1862 Mr. Howden founded the firm of James Howden and Co. with premises in Scotland Street, which had to be extended from time to time, and in 1871 new works were erected, in which for many years marine engines and boilers were constructed for steamers built on the Clyde and other districts. It is, however, by reason of his system of hot-air forced draught that Mr. Howden's name is best known, and the story of his early experiments and persistent work in this domain, in the face of much scepticism and opposition cannot be more than mentioned here. The first installation of the system, on the lines on which it has subsequently been developed, was made in 1885 in the steamer *New York City*. Its success in this and other vessels was soon such that Mr. Howden determined to relinquish the general field of marine engineering and to devote all the energies of the firm to the manufacture of forced-draught apparatus. As a result of the enterprise of the company the system has become known all over the world and is now used in practically all lines of steamers. In 1898 business had so much increased that further large extensions were made to the works and new branches added, concerned with the manufacture of high-speed engines and later of the Howden-Zoelly impulse type of steam turbine, chiefly for generating electricity in municipal stations.

Restricted time and space prevent any reference here to Mr. Howden's conspicuous share in the deliberations of the various professional societies of which he was a member. His demise will be regarded with deep regret in those circles, no less than on the Clyde, where he was so well-known and universally esteemed. In 1901, Mr. Howden assumed as partner his nephew, Mr. J. Howden Hume, and in 1907 the firm was formed into a private limited liability company with Mr. Howden as chairman. He is survived by one son, Mr. William H. Howden, who is also a director of the company, and one daughter.

Sir William H. Bailey.

As we go to press we learn with much regret of the death of Sir William H. Bailey, who died in London on November 22nd, at the age of 75. Sir William H. Bailey was the son of John Bailey, who founded the engineering firm in Salford, which ultimately came to be very widely known as W. H. Bailey & Co., Ltd., the control of which the late Sir William Bailey took over at the age of 28, his father having retired from the business. The deceased gentleman was a promotor of the Manchester Ship Canal, and by his death Manchester loses a most notable citizen.

THE LUNDIN LIFEBOAT.

DURING two days in the early part of November, exhaustive tests under Board of Trade supervision were made in the dock of Meadowside shipyard, Partick, with a ship's lifeboat of the *Lundin* type, originally an American invention well-known in the States, and now being vigorously introduced into this country by the Welin Davit and Engineering Co., London. The example tested was made on behalf of the Welin Co. by Messrs. Mechan & Son, Scotstoun. It is of metal construction and consists of a decked hull with the sides extending above deck, and with folding weather boards so designed that they may be raised almost instantaneously and locked in an upright position. The life-boat is divided into watertight compartments by a transverse and longitudinal partition, and is made self-riding by means of scuppers through the bottom in each compartment. Along each side of the boat for the greater part of the length, a deep fender is fitted, consisting of cork and canvas (in America "Balsa" wood is adopted) which adds largely to the buoyancy and righting powers of the boat, besides serving as a protection to the hull proper against chafing or puncture. The first day's tests were concerned with the properties of stability and longitudinal strength, while the second day's experiments and demonstrations consisted of tests as to the freeing properties of the valves against flooding, the capacities of the boat as to accommodation and the facility for rowing and management. All the tests were carried out very successfully.

RETIRAL OF MR. T. J. DODD.

MR. THOMAS J. DODD, principal surveyor of Lloyd's Register, Glasgow, will retire at the end of this year from the service of the Society. Mr. Dodd has been on the Glasgow staff since February, 1880, and was promoted to the post of principal surveyor for the Glasgow district in November, 1889. When he joined the Glasgow staff there were only eight surveyors in Glasgow and now there are over thirty. Like so many gentlemen who have attained to foremost positions in Lloyd's Register and in private shipbuilding works, Mr. Dodd's early training was acquired in Government establishments. He was born at Portsmouth in April, 1847, his father being the late Mr. Thomas Dodd, examiner of contract work for the Admiralty, who was well known on the Clyde and other shipbuilding centres as associated with the building of the first armour-clad men-of-war. The subject of our notice received his early education at Portsmouth, and in 1861 he was first on the list of a number of candidates examined for entrance into Portsmouth Dockyard as shipwright apprentice. In

Mr. Thomas J. Dodd.

the fifth year of his apprenticeship Mr. Dodd passed successfully through another examination and the Lords Commissioners of the Admiralty granted him a scholarship for two years. At half-yearly examinations in 1864, 1865 and 1867, which were conducted by the Director-General of Education, Mr. Dodd carried off a number of valuable prizes given by the Lords Commissioners of the Admiralty. Completing his apprenticeship period in February, 1868, he was for the remainder of that year employed both in building and laying off wood, composite and iron ships. In December, 1868, he was appointed assistant overseer at Jarrow-on-Tyne on the building of the armour-clad frigates *Swiftsure* and *Triumph*. Following upon this he was engaged in superintending the building of the turret vessel *Cyclops* in the Thames Ironworks; of four gun-boats at Woolwich, and of H.M. troopship *Assistance* at Green's shipyard. It is of interest to state that Mr. Dodd was contemporary with Sir Philip Watts, until recently chief constructor of the Navy, who received the Admiralty scholarship at Portsmouth at the same time as Mr. Dodd.

In May, 1873, Mr. Dodd was appointed to Lloyd's Register of British and Foreign Shipping, and for a time was employed chiefly in the London offices; but also as surveyor at Leith and Sunderland. While in the London office he assisted the late Mr. Benjamin Martell in the preparation of the first freeboard tables which were ultimately accepted by the Government in 1890 as the basis for assigning freeboard to vessels in the mercantile marine. In November, 1874, he was appointed exclusive surveyor at Genoa in Italy, where he superintended the building of a large number of wooden vessels which were then built in yards along the Mediterranean coast for classification in Lloyd's Register. During the three years he was stationed at Genoa he also held important surveys at Malta and Marseilles. Recalled to London for a period in the early part of 1877 he was again employed in the London office, and in surveying duties on the river Thames. In June of the same year he again proceeded to Marseilles for a period of six months, where he did important special duties, and in February, 1880, as stated at the outset, he joined the Glasgow staff, where he has been ever since. When the Glasgow Committee of Lloyd's Register was formed in June, 1890, Mr. Dodd, in addition to discharging the onerous duties of the principal surveyorship, was appointed secretary of the Committee. The latter post, however, he relinquished about three years ago.

The varied and close knowledge acquired by Mr. Dodd during the earlier part of his career has stood him and the Society he serves in splendid stead in such an important district as the Clyde, where, as is well known, work of an extremely varied and often highly specialized kind is carried on. During the thirty-four years he has been in Glasgow he has been more or less intimately connected with all the improvements which have been developed if not initiated, by Clyde builders. During the long period of his Glasgow connection he has been called upon to superintend the building of most of the largest vessels built in the Clyde district for the mercantile marine of this and other countries. Needless to say, Mr. Dodd is well known to all the shipbuilders on the Clyde who, while regretting his retiral, congratulate him on the time having arrived for well-merited rest. Although never taking any very prominent part in the deliberations of professional societies, Mr. Dodd since 1872 has been a member of the Institution of Naval Architects, and is also a member of the Institution of Engineers and Shipbuilders of Scotland, and of the Institute of Marine Engineers. His successor at Glasgow will be Mr. James French, who is at present surveyor on the chief ship-surveying staff in the United States and Canada. Mr. French, who is about forty-six years of age, joined the surveying staff of Lloyd's Register in December, 1894, and was at Newcastle for four years and at Greenock for eleven years.

LETTERS TO THE EDITOR.

B. O. T. CERTIFICATES.

To the Editor, MARINE ENGINEER AND NAVAL ARCHITECT.

Sir,—With reference to the article appearing in your July number anent the new Board of Trade Regulations, I beg to support your view that a three months' course at a technical school is not a fitting substitute for sea-going service.

Let those who framed and approved these new regulations, have their attention directed to past and present organizations of electricity generating stations. In the early days of such stations the posts of station superintendent and shift engineer were, in the main, filled by engineers whose training leaned more towards the theoretical than the practical side of engineering. To-day what do we find? The inexorable law of the survival of the fittest (for the posts in question) has placed the preference on marine engineers, an evolution of modern times—in fact, during the last decade. Surely the new regulations propose a retrograde step. It must be understood I am in no sense to be taken as speaking disparagingly of a college training; on the contrary, such training should fit an engineer for a higher post than that to which the sea-going engineer can aspire, but for the engine-room practical experience must be held paramount.

If the Board of Trade insists on encouraging marine engineers to supplement their practical experience with a scientific training, why does it not give preferential treatment to those who can produce satisfactory proof of having attended evening classes at a technical school while serving their

apprenticeship ? Everyone is agreed that the mind is more receptive in its possessor's youthful days; furthermore, the evenings during winter months, extending over a period of some five years, give facilities for laying a broader foundation of scientific knowledge, and, equally as important, perfect continuity of study with that performed at school.

The marine engineers who will take the proposed three months' course at a technical school, in order to obtain their certificates in the shorter period at sea, can be broadly divided into two classes.

(1) Those who have previously attended evening classes, and (2) those who have not.

The former, while home from sea, will merely rub up part of what they have learnt and forgotten; and the latter will strain at absorbing the little knowledge that is dangerous.

So it seems to me we have a decided retrograde movement in view.—Yours truly,

A.M.Inst.C.E., A.M.I.E.E., Extra Chief.

London, S.E., 28 Oct., 1913.

To the Editor of THE MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—As a marine engineer I feel I must add my strongest protest to those appearing in your columns upon the action of the Board of Trade in formulating their latest regulations *re* engineers' examinations. We, holding the certificates, must always keep in mind that anything which affects the qualifications for engineers' certificates will also affect us who already hold them. Therefore, it is necessary that every engineer holding a certificate should watch very carefully any proposed regulations bearing upon this point.

In this instance it is my opinion that the authorities have overstepped the line of their official duty, for the public safety certainly does not demand practical sea service to be curtailed, especially when it would be those who most require the sea service who are most likely to take advantage of it. The marine engineer is quite capable of choosing where he will be coached up if he requires it, and certainly it is a gross injustice to the efficient engineer who does not require this cramming that he shall be compelled to serve three months longer at practical work at sea than his lazy or inefficient brother.

It would be very interesting to know what is the minimum time the Board of Trade propose to accept, for instance, would two days in a school count for one day short of sea service ? This is certainly how I read the regulations, and, judging from a certain approved school's advertisements, this is how it is taken by them.

Also, it would be interesting to know how and by whom these regulations were formed. One would almost be forgiven for imagining that they were the suggestions of an interested party, certainly not a marine engineer ; I personally cannot think they have the approval of the marine engineers of the Board of Trade, who had themselves to serve five years' sea service before their application could be considered for a surveyor's appointment under the Board of Trade.

In conclusion, I wish to express briefly my views, namely, that these regulations will lower the status of marine engineers; secondly, they are unjust to the efficient man. It is, as one of your correspondents puts it, undue interference with the Board of Trade, and lastly, to my mind, a marine engineer, for the safety of the public requires all the experience he can get in the engine-room, and it is wrong to curtail that period for any excuse whatsoever.—Yours truly,

ENGINEERING SURVEYOR.

Sheffield, November 18th, 1913.

To the Editor, MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—As a marine engineer from the Far East, I should like to add my opinion to that of your other correspondents *re* the new regulations of the Board of Trade for the qualifications of marine engineers, before they are eligible to sit for examination. The extension of sea time from twelve to eighteen months before a candidate can present himself for examination I deem necessary and a step in the right direction ; but that he should be able to substitute any time spent in a technical school for actual sea service calls forth my emphatic protest.

A really conscientious man will study the theory of his business because he sees that he needs it, without having any such undesirable sop from the Board of Trade. It is safe to say that the man who will take advantage of the short sea service is the very man who ought to have longer to serve in the engine-room before he is fitted to hold a responsible position in an engine-room. It simply means that fifteen months' sea service is sufficient or else not sufficient. If sufficient, why penalize the practical man by forcing him to serve three months extra at sea. If insufficient, the Board of Trade are tempting young men to curtail a most important period of their training.

Again, before a man can hold a certificate his practical and technical abilities are tested at an examination, therefore, instead of allowing time spent at a technical school to count as sea time, why not raise the standard of the technical part of the examination ? This will make it necessary for every candidate to have at least the required amount of theory, and it does not matter how he acquires it. It will then be fair to all candidates, and also safeguard the general public who make use of the sea as a means of conveyance.—Yours truly

A VOICE FROM THE EAST.

November 20th, 1913.

REVIEWS.

Modern Pumping and Hydraulic Machinery. By Edward Butler, M.I.M.E. London : Charles Griffin & Co., Ltd. Price 18/- nett.

THIS work presents in a clear and concise form information which is specially useful to practical engineers, designers and others engaged, either in the construction or application of pumping and hydraulic machinery for any of the useful purposes wherewith this useful and in many respects indispensable class of machinery can be employed. As an indication of the wide scope of this work, it may be mentioned that the machinery described and illustrated includes that for water supply, drainage, irrigation, dredging and reclamation work. The machinery itself may be classified under the heads of direct-acting steam pumps, injectors, condenser pumps, fire pumps, high-speed pumps, variable delivery constant speed pumps, rotary, centrifugal and turbine pumps, hydraulic direct displacement, or pulsator pumps, as well as air-lift and aeration pumps. The subjects under the above heads are treated at considerable length and with useful illustrations enabling the details set out in the letterpress to be easily understood. The work comprises 500 pages of letterpress and 345 illustrations. It is divided into nineteen chapters, classified in the main under the headings as given above. As evidence of the thorough treatment of the subject it may be mentioned that a portion of the work has been devoted to the description and analysis of the various hydraulic power transmission systems in use at the present time in connection with the transmission of power by internal combustion engines.

Screw Cutting for Engineers. By Ernest Pull. London : Crosby Lockwood & Son. Price 2/6 nett.

To anyone acquainted with the modern workshop the fact is well known that the methods employed therein for carrying out work largely tend towards specialization, and it is not uncommon to find that a term of apprenticeship extending over some years may be passed through in an engineers' workshop without the apprentice at the end of that time having the slightest knowledge of screw cutting. The work in question has been written to present in a simple and concise manner all the information relating to screw cutting that can be given in a printed form, but it will be recognised that practical screw cutting cannot be effectively taught through the medium of any book. There is, however, in these days, adequate opportunity for this tuition to be given in a practical and thorough manner at the various trade schools and technical institutions, which are extending all over the country. At the same time the student is far better able to take advantage of his practical training if he has previously made himself acquainted with the various features on which successful screw cutting can be carried out. We should strongly recommend any person who is interested in this branch of

manufacture to carefully read this book. The subject has been cleverly compressed into about eighty-three pages of matter and although the letterpress is not very extensive it is quite comprehensive and lucid, and can readily be understood by the aid of the forty-eight illustrations given in the book.

The Repertoire General (General List of Merchant Shipping of all Nations, 1913-1914). Two volumes, subscription £3 3s. per annum, or separately, steamers and motor vessels £1 15s., sailing vessels £1 10s.

"The Repertoire Général" compiled under the authority of the Bureau Veritas International Registry of Shipping (which has been in existence since 1828 as a society for the classification of vessels) is issued from the head office of the Society in Paris, No. 8, Place de la Bourse, and in London at 155, Fenchurch Street. The two handsome tomes, which comprise the 1913-1914 edition and the 44th annual issue, are of the greatest assistance to the person or firm connected with the maritime world, as from the volumes the particulars of any mercantile vessel of any country may be easily and quickly gathered, the information being tabulated in a very convenient manner. The steamer volume contains all sea-going vessels of 100 tons upwards, and particulars given comprise the following:—Signal letters, submarine signals, wireless telegraphy, name of captain, flag and rig, tonnage and dimensions, date and place of build, builders' name, type of vessel, particulars of engines, horse power, owners, port of registry, list of steamship owners of the world, in order of nationality, with their addresses and names of their vessels with gross tonnages; alphabetical list of steamers arranged according to tonnage; list of shipbuilders in order of nationality; list of principal dry docks, patent slipways, floating docks in all parts of the world; list of petroleum-carrying steamers and cable steamers. The information given in the sailing ships volume for vessels of 50 tons upwards is on the same complete scale and in addition each volume contains—Mercantile tonnage statistics of the world; vessels built, bought and sold by the principal nations; vessels, the names of which have been changed; vessels having compound names, list of signal letters of all merchant vessels arranged alphabetically and according to nationality. In the sailing vessels volume lists showing vessels fitted with auxiliary motive power are given. Enough has been said to show that the volumes are of the utmost use for reference and having been carefully compiled and excellently produced, reflect much credit upon all concerned in their preparation.

Transactions of the Institution of Naval Architects.—Part I. of volume LV. is a handsome volume containing a full report of all the papers read before the Institution at the spring meetings held this year, together with the introductory speeches and discussion arising out of the papers read. The volume also contains a list of the members and particulars of the objects, bye-laws and regulations of the Institution. There is a fine whole-page illustration of the late Sir Wm. White as a frontispiece. The volume is produced in good style and is sold by Henry Sotheran & Co., 43, Piccadilly, W. The offices of the Institution are at 5, Adelphi Terrace, W.C.

Handbook of Technical Instruction for Wireless Telegraphists.

By J. C. Hawkhead. London: The Marconi Press Agency. Price 3/6.

THE wide use of wireless telegraphy at the present day has brought into being a body of telegraphists which is ever increasing, and has to include operators whose knowledge of the instruments and the working of the installation has to be of a much more extended nature than that of the average land telegraphists. The man at sea is dependent on himself and not on an army of linesmen and engineers to maintain the efficiency of the installation of which he is in charge. The present work has been written to supply a want for a concise treatise on the subject, of such a character that a diligent reader of average intelligence who has gone carefully through the book should be capable of passing the Postmaster-General's examination for wireless telegraphists. The description and illustrations of the various kinds of apparatus in use are simple and to the point, and quite sufficient for the purpose of instruction, the avoidance of unnecessary detail being particularly noticeable on going through the various chapters.

MARINE MOTOR NOTES.

Another step towards the facilities for supplying oil to vessels at out ports has recently been taken in South America by the establishment of a supply station at Buenos Aires and the consignment of a cargo of oil from Mexico. It is interesting to note that the report of oil fields in Canada has been confirmed, and the possibility of the Dominion being added to the oil suppliers of the world bids fair to be realized. The motor barges for the Thames are expected to start operations early next year; two in hand will probably be followed by others, should these prove successful, and there is every reason to believe that with good management they will do well. The mistake should not be made by the commercial man that any handy labourer can be entrusted with the care of machinery; many delicate machines have come to grief on account of indelicate hands dealing with them, and cases have come to our notice quite recently illustrating this. In South America there is a large area which might well be explored on behalf of motor engine makers, the traffic up the rivers dealing with produce from the interior might be greatly developed by means of small vessels fitted with oil spirit motors. There are a number of launches and boats already in the service, but the traffic is capable of great development. There are means at hand for the distillation of alcohol as a motor spirit from the vegetation on the banks of the rivers, and there appears to be good opportunity for enterprise to develop existing trade and establish fresh industries. The successes of vessels fitted with the Bolinders engine have led to the hot bulb two-stroke engine being looked upon with favour. Messrs. Beardmore's engines are also spoken of as reliable and economical.

The first motor-driven coble *Amelia*, for inshore fishing off the Yorkshire coast, was launched during the month. The vessel, which is of the following dimensions—Length, 31 ft. 6 in.; beam, 7 ft. 11 in., is fitted with a 15 to 20 h.p. engine. Her speed will be 10 to 12 knots.

In shipping, shipbuilding and marine engineering circles on Clydeside, considerable interest was evinced during the first part of November in the visit of the new auxiliary sailing ship *France*, in order to load a cargo of coal, coke, and general merchandise for her maiden voyage to New Caledonia. The vessel is not only the largest sailing ship in the world but she is the first large "sailer" to be fitted with oil motors. Her 6,500 metres of sail surface enable her to make, with a fairly strong wind, a speed of 17 knots, while a minimum speed of 10 knots is guaranteed by the two petrol motors of 2,000 horse-power. The owners hope to obtain an average speed of 11 to 12 knots. The vessel, which is fitted with an installation of wireless telegraphy, was built at Bordeaux last year, and is owned in Rouen. She is a twin-screw five-masted barque of 5,806 tons gross, and has 8-cylinder oil engines by Le Creusot makers.

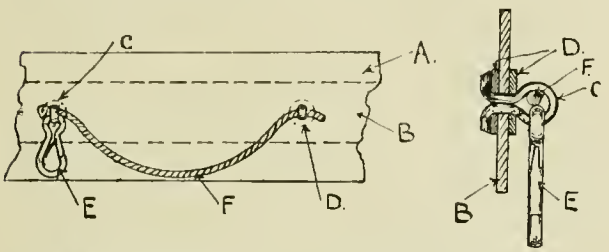
THE PITMAN BED RAFT.

MESSRS. Pitman & Company, bedding manufacturers and upholsterers, of 310, Shirley Road, Southampton, have recently patented the Pitman bed raft, which is the joint invention of Messrs. J. Musgrave and H. Pitman. Since the *Titanic* disaster of last year the inventors have been experimenting in several ways to perfect what they claim to be a great assistance in saving life, and a necessary adjunct to liners, yachts and boats of any description carrying passengers and crew.

The invention consists in a metallic frame arranged along and inside the borders of a mattress or cushion (*see illustration*), and fixed with strong split pins, which have attached to them steel spring hooks, enabling a number of the mattresses or cushions to be clipped together in a minimum of time.

The advantages of the bed raft, which combines simplicity with strength, may be briefly enumerated as follows:

1. The mattresses are filled with an African vegetable down called Kapoc, well known for its buoyant qualities, its great recommendation lying in the fact that the longer it is allowed to stay in the water the more buoyant it becomes.



A—Mattress Border. D—Metal Washers.
B—Inner Metal Frame. E—Spring Hook.
C—Split Pins. F—Life Line.
Front Elevation. Sectional Side Elevation

Pitman's Life-Saving Cushion.

2. A mattress 6 ft. × 2 ft. 3 in. weighs only 22 lbs. complete, thus making it quite easy for each passenger to carry his or her own bed mattress from cabin to deck.

3. No extra space is required for stowing.

4. Each mattress is sufficiently buoyant to support six average persons in the water, and is fitted with life line around its border.

5. There is no extra cost as compared with the ordinary horse-hair mattress as at present carried in ships.

We understand that a syndicate is under formation to exploit this invention after having been very satisfactorily reported upon by several liner and yacht captains, before whose notice the invention has been brought. All facilities are offered for inspection of the patent mattress, which appears to fulfil the claims of its inventors.

A DEMONSTRATION of the Halley (SO^2) fire extinguishing and fumigating apparatus was recently given on the s.s. *Radja* lying in the Queen's Dock, Glasgow.

"TITANIC" ENGINEERS' LIVERPOOL MEMORIAL.—Definite steps have now been taken in connection with the monument to be erected. An agreement has been entered into with the sculptor, and the memorial will be completed within two years. The Corporation has agreed to place the foundations and until the design has been submitted the committee will not hold further meetings.

THE MOTOR EXHIBITION.—This exhibition was held at Olympia from Nov. 7th to 15th, and was organized by the Society of Motor Manufacturers and Traders. In former exhibitions, exhibitors were entitled to receive complimentary tickets, which they sent to customers or likely customers. This privilege was not given, with a view to reduce the crowd, but the result was not attained, as the number of visitors seemed undiminished from our former experiences. The Main Hall with the annexe was occupied by rows of cars, a description of which would require many pages, even dealing with the most interesting; suffice to say that every variety of taste seemed to be catered for. The beauty and finish of the bodies of the cars displayed, excited admiration, and the improvements in the motors and the mechanism were striking features which appealed to the engineering instinct. The accessories displayed in one section of the main hall and entirely in the gallery, were exceedingly interesting, and showed to what an extent the motor car industry has been instrumental in adding to other industries and producing from them special fittings for the necessities and luxuries of car owners. Among the makers of tyres represented was the Beldam Co., Brentford, a name associated with marine engineering for many years. The claims of this tyre are that it offers less resistance to the roadway and therefore the car proceeds more quickly over the ground, and is less liable to skid than other forms of manufacture. The Puncture Seal Co. claim to have discovered a preparation which will heal punctures in tyres, and according to the experimental demonstrations their claim is allowed. Tools of various kinds to suit car requirements were shown by well-known makers, also lubricating appliances, one of which, for injecting grease into the case, appeared well adapted for marine service, in filling the tunnel boxes from the suppliers tins; it was exhibited by the London Motor Garage. Several oil merchants and manufacturers were represented, among them Messrs. Price & Co., whose association with oil motors and marine work is well known, both in connection with fuel and lubricating oil. As far as could be ascertained the exhibitors were satisfied on the whole with their share of the results of the exhibition, and judging from the large attendance, it may be presumed that from the visitors' point of view the exhibition was a success and the promoters may therefore be congratulated.

GAS EXHIBITION.—A very interesting exhibition was held at Shepherd's Bush during the month of October, the closing day being Nov. 1st. Besides being interesting of itself, it was commemorative of the jubilee of the Institution of Gas Engineers and of the centenary of public gas supply. The President of the exhibition was Sir Corbet Woodall, D.Sc., and the organizing manager Mr. F. W. Bridges, whose experience is considerable in connection with many previous industrial exhibitions. There was an excellent programme of events for each day the exhibition was open, popular lectures on gas, coal, heat, light and the beneficent services rendered by coal and its constituents to industrial enterprises, as well as to the households of the nation, with hints regarding the best methods to be adopted to obtain the most satisfactory results. Demonstrations on cookery were given with descriptive lectures, and competitions were arranged for school children and domestic servants, accompanied by prizes to the competitors who showed the best developments of their faculties in the art of making palatable food, and, most important to the consumer, readily digestible. The band of the Scots Guards discoursed music day by day and in the intervals between the lectures and the demonstrations. The exhibits consisted of gas engines coupled to several different kinds of machines, and to illustrate the various purposes to which gas may be applied in workshops and factory for power and light, furnaces were shown in operation for casting, enamelling, annealing and hardening metals. The by-products of gas manufacture were excellently illustrated by specimens, including all the colours produced from coal. The models of complete gas making plant, with the various illustrations showing the different parts in sections were very fine, and visitors could readily follow the process of manufacture from the coal to the gas burner; certainly this part of the exhibition, taken conjointly with the large laboratory and testing rooms fitted up and shown by Messrs. Alex. Wright & Co.., was full of interest and of great educational value. Model houses, model rooms, hospital wards, etc., were shown, fitted with all the latest improvements in heating, cooking and lighting appliances. The tower at the entrance to the building was lighted up with high-pressure gas lamps each of 1,500 c.p., while the road adjoining the entrance was illuminated by three high-pressure gas lamps, each of 4,000 c.p. By a coincidence, an electricity exhibition was held in Glasgow in November, when it was demonstrated to visitors that for power, light and heat, electricity had now shown its excellence. The rivalry between gas and electricity has been the means of improving both and the public has benefited by the advancements and improvements brought forth from time to time, so also has it been the case with respect to the application of steam and gas or oil motors.

COLD STORAGE.

IN opening the Fourteenth Session of the Cold Storage and Ice Association, at the Royal Society of Arts, on November 4th, Mr. J. T. Milton, of Lloyd's Register, the President, reviewed the progress and present position of the refrigerating industries, coupled with a reference to what the Association had done in the past and what it should aim at in the future in promoting the refrigerating industry. They would have during the session a paper and discussion upon the influence of dryness or moisture in the air upon the keeping properties of various commodities held in cold storage. This subject of hygrometry was one to which sufficient attention had not been paid, but it was interesting to note that some attempt was now being made to deal with it in the ocean transport of meat and also of fruit.

The necessity of preserving cold when produced, lead to the question and importance of insulation and to the best substances to use for the purpose, and also to the methods of applying them. It was evident that different conditions of use led to very different solutions of the insulation problem. On board vessels engaged in the ocean transport of refrigerated cargoes, the considerations of space occupied and of weight to be carried were conditions of very different character to what applied to land cold storage, where first cost and low heat-conducting power were of more importance than actual space, and where weight was practically negligible. In some cases also conditions of use prohibited certain insulators. In trawlers, in which the fish is always preserved in wet ice, and in which the insulating casing must always be wet, the insulator employed must be one which would not absorb moisture. Material which gave excellent results when employed on board ship, where long periods of low temperature, followed by equally long periods during which the insulation is not exposed to any such temperatures, did not necessarily behave in the same way when used for stores in continuous refrigerated conditions. It was unfortunately not uncommon to find in those cases the insulation frozen solid. Thus it was shown that in an ideal insulation the material should be hermetically sealed.

Underwriters now insisted upon careful and periodical inspection of vessels and their appliances engaged in sea transport, of the barges used in conveying the produce from ship to store and of the stores themselves. That these inspections had not been valueless was shown by the fact that proprietors of stores had been very pleased in some instances to make modifications in their appliances, which had lessened the risk of stoppage of the work through breakdown of small parts of the machinery.

At the present time it was not easy to remove the conviction that the initial cause of some defects was to be sought in the place of origin before shipment, as there appeared to be no possibility of controlling from this side either the conditions of local transport and loading, or even of the pre-cooling of the cargoes, the only real control being that of the veterinary officer who is responsible for the health quality of the meat.

Whilst very special attention had been given in this country to ocean transport, and very great success attained, we were much behind other countries in regard to land transport. Our conditions were, of course, very different from those obtaining in the United States, Russia and other countries, where the distances to be covered were so much greater than with us, but still the transport from ship to store, especially to inland store, and from store to the consumer called for better appliances than are available.

With regard to the subject of instruction of the science of refrigeration, Mr. Milton said it was much to be desired that refrigeration should occupy a recognised place in all Engineering Schools, Colleges, Evening Classes, etc., as in this country not enough was done in that direction.

STERNOLINE BRICKS.

STERNOLINE bricks, which are composed of special lubricating materials for use in tunnel bearings and paddle boxes of steamers, are manufactured by the Stern Sonneborn Oil Co., Ltd., of Royal London House, Finsbury Square, London, E.C. These bricks are a substitute for the usual oil, black-lead, solid oil, suet or tallow employed as lubricating mediums for the bearings in question. It is claimed that 1 cwt. of "Sternoline bricks" is equivalent to 6 cwts. of tallow or 15 cwts. of oil, and on this ground the claim for economy seems to be justified. This form of lubricant is entirely free from smell and is very clean to handle, owing to the simplicity of taking a brick out of stock and putting it directly into the lubricating boxes. They are entirely free from acids and impurities, are non-corrosive, and are not affected by tropical or arctic conditions.

The same Company have put on the market a boiler preservative under the title of "Tartricid," and claim that it is a sure preventative of the formation of scale in boilers and steam pipes, and being a pure vegetable product possesses advantages that no other boiler composition at present on the market can lay claim to. In first using "Tartricid" 1,000 square feet of heating surface requires 2 lbs. daily for three or four weeks, and after this time the amount can be reduced to 1 lb. per day. This example is given with reference to water having 12 degrees of hardness. The method of using is by dissolving "Tartricid" in water and passing it into the boiler through the feed pump, the deposit thrown down being blown out once a week after the boiler has been at rest for a short time.

An interesting exhibit which the Stern Sonneborn Oil Co. had on their stand at the recent Motor Exhibition was a lubricating substance called "Ambroleum," specially made up for use with gearing and applicable for gear boxes of all descriptions. We understand that "Ambroleum" is a pure neutral composition which is not loaded in any way, and being entirely free from acids and other deleterious ingredients it cannot exercise any injurious effect on metals with which it comes into contact. It is of a sufficiently viscous nature to prevent the gears cutting channels into it so as to leave a space, but, on the contrary, is of such a constituency as to follow the motion of the gears and thus cover them with a film of lubricant. As it is only necessary to fill up the boxes to the axle level the risk of leakage is reduced to a minimum.

SMOOTH-ON IRON CEMENT.—The Smooth-On Manufacturing Co. will be pleased to send to any reader upon application to 8, White Street, Moorfields, London, E.C., information regarding this cement, which is used for waterproofing and stopping leaks.

INTERNATIONAL ENGINEERING CONGRESS, SAN FRANCISCO, 1915.—It is proposed to hold an International Engineering Congress in September, 1915, in connection with the Panama-Pacific International Exposition in that city. The congress will be under the auspices of several American engineering societies.

MESSRS. DOBBIE, MCINNES, LTD., have recently issued a finely printed and illustrated catalogue of their nautical specialities which is well worth the perusal of those interested. Their works have recently been extended and refitted with the most modern manufacturing and testing appliances, and their patterns, etc., revised and standardized to meet all requirements. They have a complete list of Admiralty Charts with sailing directions, this department being under the superintendence of an experienced ship master

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

Launch of H.M.S. "Benbow."—On Nov. 12th there was launched from the stocks of the Naval Construction Works of Messrs. Wm. Beardmore & Co., Dalmuir, H.M.S. *Benbow*, the heaviest and most powerfully armed warship which has yet been constructed on the Clyde. The vessel is 580 ft. in length, 90 ft. in breadth and of 25,000 tons displacement, and her armament consists of ten 13½-inch guns and twelve 6-inch guns. The turbine machinery will develop about 31,000 horse power, giving the ship a speed of over 21 knots. The ceremonies of naming and launching such a large ship were in themselves sufficient to attract a crowd of spectators, but the fact that Lady Randolph Churchill, mother of the First Lord of the Admiralty, was to perform these ceremonies enhanced public interest in the event and to some extent accounted for the huge concourse of spectators, in spite of very disagreeable weather conditions. Although the armour plating is not all in position, the hull, as seen on the stocks ready to be consigned to the water, had a particularly finished appearance. The launching weight, it is understood, was 12,000 tons and the launching arrangements, all of which worked in the smoothest possible way, were practically the same as those made for the send-off of previous large battleships from Dalmuir. Descriptive particulars of the *Benbow* will be found in the Launches and Trial Trip section of this issue.

Laying the Keel of H.M.S. "Ramillies."—The launch of the *Benbow* was rendered additionally notable through the fact that promptly upon the vessel being waterborne, and while she was being towed round to the firm's fitting-out basin, the keel of a new and larger battleship, the *Ramillies*, was, for a considerable portion of her length, laid on the same building berth. Over 100 feet length of the keel structure, weighing about 300 tons, which had been suspended from the gantry cranes above the hull of the *Benbow*, was lowered into position on the keel-blocks just as the vessel was clear of the ways—this ceremony taking place, like that of the launch, to the strains of "Rule Britannia" from the band. The launch of the *Benbow* and the laying of the keel of the *Ramillies* required only about a quarter of an hour, and the latter performance only five minutes. The length of keel was put in position and work on the *Ramillies* was thus started before the hull of the *Benbow* had been taken in tow by the waiting tugs. At the luncheon after the launch the Marquis of Graham drew special attention to this part of the day's proceedings, remarking that a similar piece of work had been performed by Mr. Campbell, their manager at Dalmuir, when he was manager of one of the Spanish dockyards. On several occasions, it may be added, keel plates have been laid in British dockyards on berths just vacated by new ships, but the features of the performance at Dalmuir were that a large heavy section of keel was put fully into position, and that this was done in record time. *Apropos* of the launch of the *Benbow* and the keel-laying of the *Ramillies* it is of interest to recall that there are at present three more "Dreadnoughts" in course of construction on the Clyde—the *Tiger* and the *Barham* at Clydebank and the *Valiant* at Fairfield. One other fact of interest may be mentioned *re* the *Benbow*. She is essentially and peculiarly a Scottish production; practically all the material used having been prepared at Messrs. Beardmore & Co.'s Parkhead Works.

Messrs. W. Beardmore & Co., in order to provide berthage in their fitting-out basins for the battleship *Benbow*, had the new Allan liner *Alsatian* taken out of the basin and towed to Glasgow harbour to be dry-docked for painting before carrying out her trials. The *Alsatian*, which was launched in March last, is a sister ship to the *Calgarian*, now completing by the Fairfield Shipbuilding and Engineering Co. and shortly also to be tried for speed. Both vessels are of over 6,000 tons gross and have quadruple-expansion engines of over 2,000 h.p. indicated. A feature of their design is the now much favoured "cruiser stern." Messrs. Beardmore have recently received an order for a tender about 170 ft. in length for the Indian Marine.

Merchant Ship Launches.—The most notable contribution to merchant-ship tonnage during November was the twin-screw, quadruple-expansion, mail and passenger steamer *Tubantia*, launched by Messrs. Alexander Stephen & Sons on November 15th, to the order of the Royal Holland Lloyd, Amsterdam. The vessel is a sister ship to the *Gelria*, which was delivered recently to the same owners by Messrs. Stephen and Son.

Messrs. John Brown & Co., Clydebank, are now busily engaged placing the turbine machinery on board the new Cunarder *Aquitania*. The total weight of the turbines is about 1,400 tons. To permit of their being lowered into the hull one of the four funnels of the vessel has not been placed in position. Each of the low-pressure turbines—which are the biggest ever constructed—weighs about 425 tons. A large touring motor-car could be comfortably housed inside the casing of each. There are over 1,000,000 turbine blades, which if placed end to end would reach over 140 miles. The blades vary in length from 1¾ ins. to 20 ins., and have been made of a special metal. The method of securing them to the rotors marks another advance in steam turbine construction. It is of such a character that at least fifty times the possible centrifugal force obtained in running would be required to tear them from their roots. Thousands of pounds have been spent in experimenting, and full use has been made of the experience gained by the Cunard Company in the construction and running of their other turbine ships—the *Carmania*, *Lusitania* and *Mauretania*. In the case of the *Aquitania* an exceptionally high degree of economy will be secured by utilizing the latent energy in the steam by passing it successively through high-pressure, intermediate and low-pressure turbines to the condenser instead of, as formerly, direct from the high to the low-pressure turbines. Another special feature is the arrangement made for going astern. Each of the four propeller shafts has an independent turbine for this purpose, the two outer shafts being driven by separate high-pressure turbines and the two inner shafts by low-pressure turbines included in the casings of the two low-pressure ahead turbines. This arrangement means the saving of an unusual amount of engine-room space, and permits a most convenient disposition of the starting platform.

New Steamers on Trial.—During the month a number of important new steamers were tried for speed on the Clyde, and afterwards handed over to their owners. The new steamer *Empress Ekaterina II.*, built by Messrs. William Denny & Bros., Dumbarton, passed through successful speed trials. The new twin-screw steamer *Alaunia*, built by Scott's Shipbuilding and Engineering Co., Greenock, also ran trials on the Firth of Clyde on Nov. 10th, which were satisfactory in every respect.

Scott's Shipbuilding and Engineering Co., Greenock, have contracted with the China Steam Navigation Co. for two steamers, one of which is to be built by Messrs. Dunlop, Bremner & Co., Port Glasgow. The Greenock firm will supply the engines for both steamers.

Messrs. Dunlop, Bremner & Co., Port Glasgow, on Nov. 4th, launched the screw steamer *Guido*, which is the fifth vessel built by them during the past fifteen months for Messrs. Thos. Wilson, Sons & Co., Hull.

Messrs. Caird & Co., shipbuilders, Greenock, are reported to have acquired an additional piece of ground in the vicinity of their shipyard for the purpose of making further extensions to their works. The ground includes the area bounded by Caird Street, Laird Street, Crawford Street (Glebe) and Nicolson Street, and it is at present occupied by a dyeworks, a sailcloth factory, and other businesses, as well as by tenement buildings. During the past year or two Messrs. Caird and Co. have added considerably to their works by purchasing and demolishing old house property by which they have been too long hemmed in. Through their latest purchase additional accommodation will be provided, enabling them to develop their business still further. Of the new contracts recently given out by the Peninsular and Oriental Steam Navigation Co., Messrs. Caird & Co. are expected to have the building of, at least, two large mail steamers.

Parkhead Naval Guns.—What is said to be the largest naval gun ever made in Scotland was despatched from the Parkhead Works of Messrs. Wm. Beardmore & Co., in the first week of November, and taken by the Caledonian Railway

Co., it is understood, to Woolwich. The gun is a 15-inch one, and is the first portion of an order for such guns for the *Queen Elizabeth* and later types of battleship. It weighs about 100 tons, and is about 65 ft. in length.

TEES AND THE HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, continue to be very busy with work on hand. They are building a twin-screw steamer to be fitted with geared turbines to Messrs. John Esplen & Sons' specification for a New Zealand firm of shipowners; also a passenger boat about 270 ft. long for Messrs. A. A. Embiricos & Co., London, with machinery by Messrs. G. Clark & Son, Sunderland.

Messrs. Smith's Dry Dock Co., South Bank, continue to have a large amount of tonnage repairing, docking, etc., and are reported having a medium-sized trawler to start on.

Messrs. W. Harkess & Sons, Ltd., are still very busy with both old and new work. Amongst the new orders reported is a 270-ft. steamer for Messrs. A. A. Embiricos & Co., London, sister ship to the one to be built by Messrs. Sir Raylton Dixon and Co.

Messrs. Richardsons, Westgarth & Co., Ltd., have a fair amount of work on hand, especially in the heavy stamping department. They are reported as having secured the contract to supply the engine and boilers for a small cargo steamer of about 3,000 tons deadweight to be built by the North of Ireland Shipbuilding Co., Londonderry.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. continue to be very busy. Amongst the new orders reported is a medium-sized cargo boat for Messrs. W. & C. T. Jones & Co., Cardiff.

Messrs. Craig, Taylor & Co. have sufficient work to keep them well employed. The order reported last month is for a cargo boat of 3,500 tons deadweight for Mr. A. C. Tinsen, and to be engined by the North Eastern Marine Company, Sunderland.

Messrs. R. Ropner & Son have a large amount of work on hand. Amongst the new orders reported is a cargo steamer for the Gordon Steamship Co.; the 10,000 tons steamer building by them for Messrs. Smith & Co., Cardiff, will be the largest steamer yet built by the firm.

Messrs. Blair & Co. have a large amount of work on hand. They have secured the contracts to supply nearly all the orders for the machinery for the steamers building at the port. The work on hand will keep them busy well on for a year.

West Hartlepool.

The Neptune Steam Navigation Co. (Messrs. Furness Withy & Co., managers) have sold the s.s. *Cleveland Range* to Italians through Messrs. H. C. Moss & Co., for about £18,000. She is a steamer of 3,534 gross tons. Messrs. Rickinson & Son have sold the s.s. *Arion*, 2,338 gross tons, to T. Pangalos Syra, who has renamed her s.s. *Thendoros Pangalos*. The Greatham Steamship Co. (Messrs. T. Appleby and Sons, managers) have sold the s.s. *Maude*, 3,254 gross tons, to Austrians for about £27,500.

Messrs. W. Gray & Co. are very busy at both the old and new yards. Amongst the new orders recently reported is an oil-tank steamer on the Isherwood principle for Norwegian owners; two cargo steamers for Messrs. C. K. Hansen and Co., Copenhagen, also two cargo steamers of about 7,500 tons deadweight for the British India Co., Glasgow.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are still very busy on both old and new work. The s.s. *Hambleton Range*, recently built by them and which was bought by Messrs. J. Esplen & Co., Liverpool, has been resold to Messrs. H. E. Moss & Co., Liverpool, who have renamed her the s.s. *Tanis*. Amongst the new orders is a cargo boat for Messrs. W. H. Cockerline & Co., of Hull, for about £53,000, to carry 8,000 tons deadweight.

Messrs. The Central Marine Engine Works of Messrs. Wm. Gray & Co. have secured the contracts to supply all the machinery for the boats to be built at both the old and new yards, and great alterations are anticipated to cope with the increase of work.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, are as busy as ever. Amongst the new orders for steamers is a cargo boat of about 8,000 tons deadweight for Messrs. Chellew & Co., Truro, for about £53,000, nearly sister ship to the boat to be built at their Harbour Dockyard for the Cockerline Co.

Messrs. Richardsons, Westgarth & Co., Ltd., have secured the contracts to supply the machinery for all the steamers building by the Irvine Shipbuilding Co.; also it is reported a large geared turbine steamer to be built by Messrs. Sir Raylton Dixon & Co., Middlesbrough. They have several large condensing plant contracts on hand, and mention may be made of a large one for Buenos Ayres. I am sorry to have to report the death of the able manager of their turbine works, Mr. James Bonelle Willis, who has had entire charge from the commencement of this branch of the works.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Hull Shipping.—The various docks during the month of November, have been severely taxed, so much shipping coming to the Port from all parts of the world, with heavy cargoes of grain, provisions, etc. It is understood that the New Joint Dock will be opened by the King in May or June, 1914. It is stated all quay spaces are taken up by the different Steam ship Companies.

The Baltic Season is now about finishing for the year, as the Baltic ports are being closed with ice. The great amount of timber now arriving is enormous, the quay spaces abound with all sorts of wood, and the Railway Companies have great quantities to deal with.

Hull and Australia.—An important development in connection with the efforts that are being made at Hull to foster trade between Australia and the port has taken place in the formation of a local Company which has been formed under the title of the Humber Fruit Brokers, Limited. The Company will have a capital of £10,000. Its object is to develop the fruit trade between Hull and Australia, Canada, the United States and Mediterranean ports. All the subscribers are well-known and prominent fruit merchants of Hull. There have been general consignments of fruit come to the port direct from Australia and the quality has been highly satisfactory, and very high prices secured at the action sales, hence the development.

Goole Shipping.—The ss. *Liberty* owned by the Lancashire and Yorkshire Railway Co., when on a voyage from Hamburg to Goole some five weeks ago, to avoid a collision in the upper reaches of the Humber, ran ashore. Strenuous efforts have been made from time to time to release her, six tugs were engaged, but their force, united with that of her own engines, was insufficient to move her. It is feared that nothing more can be done until January.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping very busy with new steamers building, and still booking orders for local and foreign owners. The Company's patent slips are fairly well employed with steamers undergoing repairs, sighting bottoms for Board of Trade, Lloyd's and British Corporation Surveys. The engine and boiler shops are working at high pressure. The outside staff have also had a fair amount of work at the different docks. The firm has just launched a finely modelled screw steamer named *Matalian*, which is described elsewhere in this journal.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, have just booked two sets of machinery for export. All the different departments are fully engaged and all machines working to their fullest capacity. The firm has a large amount of engines and boilers in hand for the different members of the fishing industry, who are having trawlers built at Selby and Beverley, and at the moment are fitting machinery and boilers on new trawlers in the various docks, and preparing for steam trial trips, before handing over to their new owners. The branch shop situated at Alexandra Dock is kept fully employed with graving dock work in general and opening out for the different surveys.

Messrs. the North-East Coast Engineering Works (Hull), Ltd., engineers and ship repairers, have had a fair amount of work

during the month on the following steamers :—s.s. *Ardmount*, s.s. *Co-operative*, s.s. *Monmouthshire*, s.s. *Bramley*, s.s. *Raloo*, s.s. *Tyre*, also the sailing ship *Henrietta*. The s.s. *Ardmount* had very extensive repairs on deck and engine-room. The sailing ship, extensive repairs to rigging and general repairs on deck, vessel dry-docked and surveyed, lifted rudder, etc. The steamers received the usual run of repairs on deck and below. Several enquiries have been received from owners who have vessels bound for Hull.

Messrs. Stewart & Craig, engineers and ship-repairers, have been employed on the following steamers :—*Marmion*, *Givenonda*, *Mayflower*, *Grindon Hall*, etc., some of the vessels undergoing extensive repairs on deck and in engine-room. This firm are close to Victoria and Alexandra Docks, and in a good position to deal expeditiously with general repairs and graving dock work.

Thomas Tate, engineer and boilermaker, has been fairly busy during the month on general repairs on deck and engine-room on coasting steamers and tug boats and in some cases opening out for surveys; also has had staff outside on the different docks.

Messrs. Woodall & Co., engineers, have been exceedingly busy during the month, on general repairs on several Danish and Swedish steamers and local steamers. The different departments are well employed, the smithy is working on forgings for several small shipyards throughout the country for stems, and rudder posts, also forgings for the London County Council and Hull Corporation. The firm have also had several enquiries from ship-owners for Fisher's patent boiler scaling appliance tools, and the firm's patent cargo blocks.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, Neptune Engine Works, have had a fair month with repair work on the several docks, the branch shop situated at Alexandra Dock has been employed opening out for surveys, etc. The firms own graving dock has had a number of steamers undergoing repair work, and is well booked up for steamers during December. Orders are being booked from home and foreign Steamship Companies. Their patent propeller is in good demand.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, are well booked ahead with orders for boilers and machinery for coasters, trawlers and tug boats. The machinery department is working night and day to compete with the great amount of work in hand. The firm are also receiving many orders from different trawler owners for their patent compound trawl winches; these are very powerful winches. The branch shop at Alexandra Dock is having a fair share of repair work, opening out boilers, machinery, and graving dock work, for survey, etc. and many enquiries have come in.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby are very busy building coasters, trawlers for Hull, Grimsby, Boulogne and Cork. The firm have several trawlers now fitting out at Hull, receiving boilers and machinery, etc. and preparing for trial trips.

H. Scarr & Sons, shipbuilders, Hessle, are busy on work for the Humber Conservancy.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(From our Own Correspondent.)

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Last month two 56-ft. steam pinnaces for the Argentine battleships *Rivadavia* and *Moreno* completed successful trials, and will shortly be handed over. H.M.S. *Laurel* (late *Redgauntlet*) was running official trials last month, preparatory to handing over. The engine works are running full on various contracts.

Messrs. Simpson, Strickland & Co., engineers, etc., Dartmouth, South Devon.—The above firm have a good amount of work in hand and have just completed a 63-ft. steel steam tug, which left last month under her own steam for Rio de Janeiro. A 60-ft. steel high-speed light draught steam launch was also completed for the India Office. A 25-ft. motor launch and a 23-ft. motor lifeboat with two-cycle 16-b.h.p. paraffin motor of the firm's own make were running trials, and a 50-ft. double skin teak boat, with compound engines and direct tube boiler, was completing for shipment abroad. Work in hand includes four 30-ft. mahogany steam launches with triple engines and oil-fired boilers for the Red Star Line, two of which are for the *Lapland*. A large number of boats are laid up for the winter, on many of which repair work is in progress.

Messrs. J. I. Thorneycroft & Co., Ltd., Southampton.—H. M. torpedo-boat destroyers *Paragon*, *Porpoise*, *Unity*, *Victor*, *Lance*, *Lookout*, *Meteor* and *Mastiff* are in progress, and the *Victor* was launched towards the end of last month. Good progress has been made with the Customs cruiser *Margaret* for the Canadian Government. The keel of the first of the ocean-going tugs for the Argentine Government was laid last month, and the framing is now well advanced. Several motor boats completed successful trials last month, and others are approaching completion. A considerable number of general engineering jobs have been carried out during the past month, and the repairs department has, as usual, been well occupied.

Messrs. Day, Summers & Co., Northam Ironworks, Southampton.—This firm continue very busy with several contracts, among which may be mentioned three small intercolonial steamers for the Royal Mail Steam Packet Co. for early delivery.

Engineers' Strike at Southampton.—The engineers of the R.M.S.P. Co.'s *Arlanza* handed in their resignations a few days before the 31st of October, the advertised sailing date. The strike was general, and the junior engineers of all the Company's boats in the United Kingdom gave notice simultaneously. The chief grievance was that of the pay of the junior engineers, and also the conditions under which they worked both at sea and in port. The negotiations on the men's behalf were carried out by the Marine Engineers' Association, in conjunction with the Amalgamated Society of Engineers. The matters in dispute were settled at a meeting with the R.M.S.P. Co. in London, and the *Arlanza's* engineers signed on and she sailed to time.

Ship on Fire.—On the 18th of November, word was received at Southampton that a steamer was on fire off the Isle of Wight. The steam tug *Hector* immediately proceeded to the burning vessel, and eventually got her towed to Calshot at the entrance to Southampton Water, where she was beached on the 20th, still smouldering. The steamer proved to be the *Scots Dyke*, of 2,600 gross tons, owned by James G. Allan, of Gordon Street, Glasgow, and was built at West Hartlepool last year. The blazing vessel was sighted by the super-"Dreadnought" *Iron Duke*, which was preparing for her full-power trials. She immediately abandoned these, and steamed at full speed towards the *Scots Dyke*, and the crew were speedily rescued from their perilous position. The *Scots Dyke* was proceeding up the Channel on her voyage from Venice and Tunisian ports to Sunderland, and had a large deck cargo of esparto grass, which became ignited and soon drove everyone aft. Fortunately the wind was in a favourable direction and the poop was sheltered from the intense heat. The forward lifeboats were soon burnt to cinders, and owing to the heavy seas it was almost impossible to get the two remaining boats launched and one had to be abandoned. The *Iron Duke* fortunately appeared at this stage and soon had the crew and two passengers safely transferred and landed at Portsmouth.

THAMES.

Launch of Royal Mail Co.'s Steamer.—This Company has had put into the water for them the *Alcantara*, built by Messrs. Harland & Wolff, Ltd., at their Glasgow yard, and described in our launch columns.

P. & O. Co.—The officers of the P. & O. Co. have been successful in obtaining improved conditions of service from their management. The dispute was of a lightning character, and was settled to the satisfaction of all concerned in a very rapid fashion.

The Dockers.—There is unrest among the dockers on the Thames, where it is said the agreement of 1911 is being broken by the Port Authority. The contagion from Dublin is answerable for a good deal of this, but it shows when trouble of this kind is once started how it spreads.

Largest Vessel to enter Thames.—If London is no longer a shipbuilding centre it certainly bids fair to hold its own as a shipping port. Sometime ago we had the Cunard liner, the

Andania, of 13,405 tons gross, entering the Greenland Dock, and now the White Star Co.'s new boat the *Ceramic* comes to the Tilbury Dock, she is of 18,480 tons displacement, *i.e.* 4,164 tons heavier than the *Minnewaska*, the previous largest ship to enter the dock. The vessels width is 70 ft. and there was a space of about 5 ft. to spare on each side in the lock. A greater difficulty was, it is thought, the depth; there is 38 ft. over the sill and it was supposed the vessel would draw 32 ft. It took, we understand, just two hours from the time she first appeared off the pier-head for her to be safely moored in the dock alongside the quay, so this was not a bad performance and speaks well for Tilbury.

National Sea Training Conference.—This conference, which meets annually on Trafalgar Day, was presided over this year at the County Hall, Spring Gardens, by Mr. Geoffrey Drage. There were present Members of Parliament, members of the Royal Navy and Mercantile Marine and also over one hundred local authorities. The resolutions moved were of a very practical character, with a view of affording support to nautical training both by grants direct and for shipowners to carry boys under special conditions. It was also agreed that schools on the riverside or at ports should be supported specially by a syllabus arranged to meet nautical requirements.

City Steamship Co.—This Company which runs the service of steam boats on the river, has had a very satisfactory season and paid over eight per cent. dividend, but no allowance has been made for depreciation, and if this had been done the profit would have been absorbed. Under the circumstances the directors would therefore they say be ready to consider any offer for the boats. This, therefore, does not look very well for the river service as a trading concern.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

THE Mersey continues to receive its appropriate share of important new tonnage, further mercantile work having been placed locally.

Messrs. Cammell, Laird & Co., Ltd.—At the time of writing the Portsmouth-built "Dreadnought" *Iron Duke* is carrying out her trials. The whole of the machinery has been supplied by this firm, who also have at present the hull and machinery of the *Caroline* and the machinery for the *Cleopatra* light armoured cruisers. The destroyer *Garland* will leave shortly for commission, the machinery for which vessel has been supplied by Messrs. Parsons. It is reported that this firm have secured an order for a second steamer from Messrs. Embiricos for the Greek mercantile marine. The four boats now building at Birkenhead for the P. & O. Co. are, it is understood, to be named *Khiva, Khyber, Karmala* and *Kalyan*. The *Khiva* is now nearing completion, while the *Khyber* will shortly be launched. The repair department is fully employed, the Anglo-American steamer *Narragansett* having been in dry dock some time undergoing extensive repairs. The Blackpool Co.'s *Queen of the North* and the Liverpool and North Wales *St. Elvies* are being reboilered. The Canadian Northern *Royal Edward* is in for annual overhaul; the Booth Line steamer *Dunstan* is also in hand.

Messrs. Kermode's, Ltd.—This firm have recently secured the order for a complete oil-fuel installation for the Swedish battleship *Sviebe*, now building at the Gothenburg ship building works. This vessel will have 20,000 .horse-power and a speed of 22½ knots, and will be fitted to burn both oil and coal.

The Manchester Ship Canal.—Messrs. Pearson & Knowles, Coal and Iron Co., have under consideration the gradual removal of the Dallam and Bewsey forges from Warrington to a site adjacent to the Partington Steel and Iron Co.'s extensive new works at Irlam, in which the former Company are large shareholders. The Wholesale Co-operative Co. are also about to erect large works for the making of margarine at Irlam. This Company have already extensive works here for the manufacture of soap, candles and glycerine. The First Lord of the Admiralty paid a visit to the canal and docks recently, accompanied by Mr. J. K. Bythell, chairman.

Liverpool University.—A course of three lectures has been arranged to be delivered upon subjects of special interest to Liverpool. The first will be on the "Safety of ships at sea, by Prof. W. S. Abell. Professor Watkinson will lecture on "Recent developments in marine propulsion," while Prof. Marchant who has recently carried out important research work in connection with wireless telegraphy, will lecture on "Wireless telegraphy at sea."

Blacksod Bay Route.—Attention has recently been again directed to this project for a short sea route to Canada. The Midland Great Western Railway of Ireland have evinced practical interest in the proposition by voting the sum of £3,000 towards the promotion of a bill in the next session for Galway port project.

Liverpool Engineering Society.—The inaugural meeting for the session was held on Nov. 5th at the Royal Institution, Colquitt Street, when Mr. F. E. Cooper, the new president, delivered his opening address. The subject of the address was "The road and its users," during the course of which the subject of the methods of developing the motor lorry traffic of the port was dealt with. With the increasing necessity of improved transit for goods this subject is of great importance.

Cunard Line.—The *Alaunia* arrived in the Mersey from Messrs. Scott's, of Greenock, on November 12th, and sailed on the 25th, taking the fortnightly sailing to Boston, in the place of the *Franconia*, which has been transferred to the New York, Mediterranean service.

The Oil-Engined Steamer "Annam."—Much interest was aroused in the visit of this vessel to Liverpool at the end of October, when she arrived with a cargo of beans from Hankow. This vessel, which was built and engined by Messrs. Burmeister & Wain, of Copenhagen, is 425 ft. long, 55 ft. beam, and a depth of 38 ft. 6 in. A deadweight of 9,400 tons can be carried on a draught of 26 ft. 4 in., at a speed of 11½ knots. Twin screws are driven at 126 revolutions per minute by means of two 8-cylinder Diesel engines developing 3,200 h.p., using 10·8 tons of crude oil per twenty-four hours at full speed. 1,254 tons of oil are carried in the double bottom while 80 tons are stored in a deep tank for emergency use. A patent reversing gear is fitted, which reverses in two seconds, the oil supply being automatically cut off during the operation. This vessel arrived back at Copenhagen about November 9th, when she completed 27,000 miles during the round trip. Captain H. P. Berg is in command.

Patent Fenders for Lifeboats.—Mr. W. L. Rosseter, an officer in one of the large lines sailing out of Liverpool, has patented a resilient fender for attaching to the side of the boat, which consists of large clips or forks attached to the sides of the boat. These prevent stoving in and also do not catch on sides of ship. These clips can be hauled aboard and used for other boats.

Liverpool to Fort William.—The Canadian Government are now busily engaged upon the improvement of the whole canal system between Montreal and Fort William. The Welland and Soo canals are to be rebuilt; both are to have a depth of 31 ft., which can be increased to 35 ft. in the future.

The Marconi Company in Canada.—Under contract with the Canadian Government this Company have completed four stations on the Great Lakes, one of which is now being enlarged, while three other stations are being constructed. By the end of the year the duplex receiving station at Louisburg and the six-wire duplex transmitting line to Glace Bay from Louisburg will be complete. The duplex system will be put into operation as soon as the Clifden station in Ireland is completed. During a recent session of Parliament the Canadian Government enacted a law making wireless compulsory on all steamers in Canadian waters. The capital of the Company has recently been increased by the issue of 500,000 new ordinary shares of £1 each.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There is still a great deal of rush in the shipbuilding trade of this district. Vickers' Ltd. are doing all they know to secure the delivery of some of the big ships they are building for the home and foreign governments. Some irritating delays caused by labour troubles, gales and other causes, have kept back the progress of much of the work in hand, and the difficulty experienced

in getting hold of a sufficient number of skilled and unskilled men has also led to delays which were not anticipated. The cause of this difficulty has been the great scarcity of dwelling-houses for working men in the town, but this problem is being remedied as quickly as possible, though the need for greater attention to this important matter is shown to be highly desirable. So far as labour difficulties are concerned, Messrs. Vickers, Ltd., are shown to have every desire to meet the reasonable demands of their men. Thus it has happened that when a strike has occurred it has only lasted a day or so before a settlement has been arrived at. The firm cannot afford to let any portion of their works stand idle, as practically all the heavy contracts they have on hand have been accepted on given time delivery conditions. There are more men employed at the Barrow shipyard than at any previous time in its history. Over 1,000 additional men are at work now as compared with January last, and if there were plenty of artisans' dwellings available quite another thousand men would be at once engaged.

"Emperor of India."—By the time this appears in print the super-"Dreadnought" building at Barrow by Messrs. Vickers, Ltd., will have become waterborne, the launching date being Nov. 27th. Lady Islington named the ship. This vessel should have been launched some months ago had it not been for delays in her construction brought about by the destruction of a great cantilever crane in a storm in November last year. This necessitated temporary cranes being erected, and it also has resulted in the adoption of the tower system of cranes, nine in number, on the sides of No. 1 and No. 2 big launch ways. These cranes, which are being erected by Sir Wm. Arrol & Co., Ltd., are capable of lifting by means of electricity ten tons and thirty tons. One of these cranes is now ready, and although some difficulty was caused to begin with in getting these cranes to work satisfactorily, the preliminary trouble has been got over and the cranes are now working with every satisfaction, and with every prospect of proving economical lifting agents.

Brazilian River Monitors.—The river monitors built by Messrs. Vickers, Ltd., for the Brazilian Government are making rapid progress. The first of the three, the *Javary*, has gone through her trials very satisfactorily, after alterations in her design and construction suggested as a result of her trials on the Clyde, and she will be ready to proceed to Rio de Janeiro in the middle of December. Her sister ships, the *Solomies* and the *Madeira*, will be ready to go for their trials on the Clyde, the first-named in the middle of December, and the last-named in the middle of January.

Turkish Battleship "Reshadieh."—The work on this Turkish "Dreadnought" is proceeding rapidly, as the Sultan's Government are anxious to get delivery of her at the earliest date. There seems now to be an end of the many rumours that this ship was likely to be bought by some other Power, but as Turkey wants her for her own Navy there is no chance of her being transferred. She is likely, it is said, to be ready for delivery in May or June next year. In the meantime Turkey is making the biggest bid for the "Dreadnought" *Rio de Janeiro* building at Elswick, with engines built by Messrs. Vickers, Ltd., for the Brazilian Government. It is said the Brazilians want another battleship to be driven by oil fuel, but there seem to be financial reasons for the sale of this ship.

Light Cruisers.—The two light cruisers building by Messrs. Vickers, Ltd., for the British Navy are making considerable progress, but the hurry necessary to get the *Emperor of India* ready for launching by the 27th November has withdrawn several men from these two ships temporarily. They will return to these vessels after the launch.

Submarines.—This department of Messrs. Vickers' shipyard has lately been considerably enlarged, and a great deal of work is now passing through it, including several of the "E" class of vessel, and one of a larger and more powerful type which will probably be known as the "F" class, which will have great speed and big fighting power in deep waters. She will also be better fitted up with torpedoes and quick-firing guns than any of her predecessors. It is predicted that submarines twice the size of the "E" class will be afloat in a few years. This is doubtless the reason why Messrs. Vickers, Ltd., have increased the size and producing capacity of this department of their works.

The Japanese "Kongo."—This battle cruiser, which left Barrow last month for the Far East, and proceeded by way of the Cape of Good Hope, has arrived at Japan and is reported to have behaved herself quite satisfactorily *en route*. Opportunity was taken of running the vessel at high cruising speeds in order to familiarize the engine-room complement with their work. It is rumoured that Japan is about to place an order with Messrs. Vickers, Ltd., for a very large and up-to-date battleship.

Engineers' Wages.—During the month the members of the Amalgamated Society of Engineers employed by Messrs. Vickers, Ltd., have given six months' notice of an advance in wages from 36/6 to £2 2s. a week. The present agreement expires at the end of March next. It is hoped an arrangement will be made by means of which there will be no need to close down one of the very busiest departments in the firm's works at Barrow.

BELFAST.

(*From our Own Correspondent.*)

State of Trade.—Although the output of new tonnage from the Belfast yards during 1913 will fall short of the figures for 1912, this is not an indication of less busy times; on the contrary, shipbuilding and engineering on the Lagan have rarely, if ever, been in a more prosperous state. The falling off is chiefly due to the fact that Messrs. Harland and Wolff have of necessity not launched any vessels from the north end of their yard this year. And the reason for there not having been any launches from these particular slips is that they are occupied by vessels of such huge proportions that although the keels were laid down in 1912, and work has been proceeding upon them in full swing ever since, it was foreseen that it would be impossible for them to reach the launching stage in 1913. These vessels are, of course, the White Star, Red Star and Holland-America liners.

Messrs. Harland & Wolff.—The last launch of the year from the Queen's Island will be that of the *Euripides*, building at the south end for the Aberdeen line. This is a vessel of about 15,000 gross tonange, and is considerably bigger than any of the other vessels sailing under Messrs. Thompson's flag. In one of the adjacent slips Messrs. Harland and Wolff are building a steamer of between 17,000 and 18,000 tons for the Atlantic Transport Co., which will exceed in size anything yet put in the water from this end of the yard. A few years since a vessel of 10,000 tons gross tonnage was looked upon as being very big for any of these slips, but the berths were lengthened and the foundations piled, so that steamers of very much longer dimensions can now be constructed there. At the North End rapid progress is being made with the three leviathans referred to in the first paragraph of these notes, the plating of the White Star liner *Britannic* being fully completed. She will be ready to leave the ways early in the new year. Since last month's notes were published, the Atlantic Transport liner *Maryland*, which was built in Messrs. Harland & Wolff's Clyde yard, and was brought to Belfast to receive her machinery, has been completed and sent to sea.

Messrs. Workman, Clark & Co. should stand high in the year's output of new tonnage. They have already launched nine steamers and an Admiralty caisson with an aggregate of over 70,000 tons gross. On the 13th of November they launched a twin-screw steamer named *Star of Victoria*, built by them for Messrs. J. P. Corry & Co.'s Star line. Messrs. Workman, Clark & Co. have recently completed the fitting out of the Holt liner *Phemius*, which was launched by them in September, particulars of the vessel being given in that month's issue of the Marine Engineer.

THE BRISTOL CHANNEL.

(*From our own Correspondent.*)

Cardiff, Barry and Swansea.

THE shipping and marine engineering industries in this district, as represented by the dry dock and repairing establishments have been better employed during the past month than during the previous two months, although at the same time business has not yet reached the high pressure stage so common in the earlier part of the year. During the latter part of last month outward chartering was quiet and consequently arrivals were slow, this circumstance partly

explaining the absence of briskness in ship-repairing establishments. Another reason is that a large amount of work is being done on the continent which was formerly executed in the Bristol Channel, the main reason underlying the change being in the lower working costs obtaining in the former ports and consequently less expense to the shipowner. At the same time Bristol Channel firms still seem able to secure some of the choice repairing jobs on the market in competition with the leading ship-repairing firms of the United Kingdom. This fact is widely commented on in other districts which have not an intimate acquaintance with the resources available in the ports of this district, and the fact that large establishments equipped with thoroughly modern appliances exist here is not so widely known as it should be.

Mountstuart Dry Docks, Ltd.—The three dry docks of this Company have been kept continuously busy during the last month, the steamers *Crown of Grenada* and *Bankfields* having considerable stem and bow damage repairs, and the steamers *August* and *Knight Templar* extensive bottom repairs. The steamer *Broderick* has undergone general and boiler repairs. This company was also successful in obtaining the contract for very large repairs and renewals on the New Zealand Shipping Company's steamer *Rakaia*. This steamer belongs to a leading concern in the colonial trade from London and recently discharged a cargo of grain from Australia in the Roath Dock.

At the time of writing these notes a further accession of work has been received in the arrival of the steamer *Den of Mains* from Swansea. This steamer was recently badly ashore and requires the whole of the bottom plating and floors forward of the stokehold bulkhead to be dealt with. The vessel had been dry docked at Swansea for examination and the Mountstuart Company were successful in getting the work in the face of competition by ship repairing firms from all parts of the country.

Cnannel Dry Docks and Pontoon Co.—The several establishments under the control of this Company have been well employed in general work. The overhaul to the steamer *Hendaye* was completed, and damage repairs executed on the steamer *Craigston*, general repairs being carried out on the Dutch oil-tanker *J. B. Aug Kessler, Maresfield, Russ, Eireni, Goathland, Baron Polwarth*, etc.

Hill's Dry Dock and Engineering Company completed repair of damage sustained by steamer *Hero* in a collision with another steamer in the Avon, also general repairs to several other steamers of the coasting type.

Messrs. Elliot & Jeffery, amongst other work were engaged on general repairs to the steamers *Salvus, Visigoth, Nereus* and *Poldhu*, part of the work on the latter steamer including the putting in of a new donkey boiler.

Messrs. Mordey & Carney secured the contract for repairing bottom damage to steamer *Milos*, which was recently ashore at St. Nazaire. The damage proved to be extensive and comprises about sixty plates.

The Penarth Pontoon Co. have had a fair run of trade and an example of the size of steamers handled by this Company is furnished by the *Anglo-Patagonian*, a vessel of 450 feet in length and 9,000 tons deadweight.

Barry Firms have been actively engaged during the month and seem to have had a large share of the available work. The Graving Dock Company executed general repairs to steamers *Trelawney, Knight Companion, Beethoven, Rotherhill, Zero, Baldersby* and *Glenetive*. They also secured the contract for repairs to the steamer *Haydon*, which was recently in collision with a Greek steamer and sustained extensive damage. The bridge and lifeboats were carried away, whilst the damage to the side plating was heavy.

Messrs. C. H. Bailey had a good list of completed work for the month, which included bottom damage on steamers *Commonwealth, Alicia* and *Greenwood*, and general repairs to *Apollo, Brodmount, Coulsdon, Ockley, Welbury, Mohacsfield* and *Farley*.

The points at issue in the labour dispute which occurred recently at the Tredegar Dry Dock, Newport, were satisfactorily adjusted and work was resumed on the steamer *Lissa* occupying the dry dock.

At **Swansea** the most extensive job was on the steamer *Katina*, the damage repairs being so heavy that the execution of them kept the dock locked up for some time. Other repairs of less importance were in progress, but on the whole the general state of the repairing trade in this port was quiet.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Joseph T. Eltringham & Co., Ltd., S. Shields.

NORMANDIE. October 16th. Steam screw trawler, specially adapted for the salt cod fishing trade, and believed to be the largest trawler built up to the present. The vessel is being constructed to the order of a French firm.

Northumberland Shipbuilding Co., Ltd., Howdon.

NEW ZEALAND TRANSPORT. October 29th. Built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Empire Transport Co., Ltd., London. The vessel is about 400 ft. long by 52 ft. beam by 29 ft. 6 in. deep, of the single-deck type and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle. Accommodation in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry over 8,000 tons on a light draught and steam about 10 knots loaded at sea. During construction the vessel has been superintended by Mr. Ross and Mr. Flower.

MENDIP RANGE. November 13th. Built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Neptune Steam Navigation Co., Ltd., under special survey to the highest class at British Corporation. Dimensions about 400 ft. long by 52 ft. beam by 29 ft. 6 in. deep, single-deck type, fitted with long bridge, poop and topgallant forecastle. Accommodation is provided in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry over 8,000 tons on a light draught and steam about 10 knots loaded at sea. During construction the vessel has been superintended by Mr. Ross. Messrs. Wailes, Dove and Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, engine and boiler room, tank and bilges, and their patent "Bitumastic" covering to the tank tops.

Swan, Hunter & Wigham Richardson, Ltd., Neptune Works, Newcastle-on-Tyne.

CHESTERFIELD. October 30th. Built for the Great Central Railway Company's service between Grimsby and Rotterdam. The vessel is intended for the carriage of cargo and horses, and she will also have accommodation for a limited number of passengers in a long house amidships. She is 250 ft. in length by 34 ft. beam, will carry about 1,100 tons of cargo on a light draught of water, and is being built to attain the highest class in Lloyd's Register. The propelling machinery is also being constructed at the Neptune Works, and consists of a set of triple-expansion engines supplied with steam by two large boilers. These engines and boilers are expected to drive the vessel at a speed of 13 knots when fully loaded. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, coal trunks, open bottom under boilers, etc.

ELSINORE. November 12th. The ship is to carry petroleum oil in bulk, and is being built for the Bear Creek Oil and Shipping Company, of Liverpool, of which Messrs. C. T. Bowring & Co. are the managers. The *Elsinore* is the thirteenth ship that these builders have constructed for the Company, and she is a sister ship to the *Rosalind*, which was delivered last April. Built on the Isherwood system of longitudinal framing and to Lloyd's 100 A1 classification. Dimensions: Length 432 ft. over all, breadth 52 ft. 6 in., and deadweight carrying capacity about 9,700 tons. The triple-expansion engines and the boilers are being built by

the Wallsend Slipway and Engineering Company. Steam will be raised either by burning coal or oil.

Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.

RYTON. October 30th. Built to the order of the Red "R" Steamship Co., Ltd. (Messrs. Stephens, Sutton and Stephens, Newcastle-on-Tyne, managers). Length 366 ft. by 50 ft. 10 in. breadth extreme by 27 ft. 4 in. depth moulded, and constructed under special survey to Lloyd's highest class. Single-deck type, with poop, bridge and topgallant forecastle. The accommodation for the captain is in a steel deck house and for the officers and engineers in sidehouses on the bridge, whilst crew will be berthed in poop aft. The vessel is specially adapted for the general cargo and wood trade, and has large hatches and clear holds, and will have a thoroughly up-to-date equipment of deck machinery, including eight steam winches for the quick and economical handling of cargoes. Triple-expansion engines with cylinders 25 in., 41 in. and 68 in. by 45 in. stroke will be supplied by the North Eastern Marine Engineering Co., Ltd., of Wallsend. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" covering has been applied to the tank tops in engine and boiler spaces, also in donkey boiler recess and tunnel.

Robert Thompson & Sons, Ltd., Southwick.

BERTRAND. November 14th. Cargo steamer, built to the order of Messrs. Turnbull Brothers' Shipping Co., Ltd., of Cardiff. Length overall 371 ft. 3 in., breadth 51 ft. 9 in., and depth moulded 23 ft. 4 in. She will take the highest class at Lloyd's, and is of single-deck type, with full poop, cargo bridge amidships, 220 ft. long, and topgallant forecastle, where the crew will be comfortably berthed. Ample water ballast is provided in the cellular bottom and after peak tank. The cargo holds, clear of all obstructions, are divided by a centre longitudinal steel bulkhead, with five cargo hatchways, having double derricks fitted on tables with crosstrees at mastheads, also derrick posts to bridge hatches, all arranged for rapid loading and discharging and worked by powerful steam winches. A large multitubular donkey boiler of ample capacity will supply steam to deck machinery. Accommodation is provided in a large steel house on the bridge deck for the captain, chief officer, steward, spare room and dining saloon, the latter being tastefully fitted up in oak. Spacious rooms for the engineers, petty officers and apprentices, with messroom, bathroom, etc., are situate in steel houses at sides of the engine casing. The engines, by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, have cylinders 25 in., 41 in. and 67 in., with a stroke of 45 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch. During construction the vessel and machinery have been under the personal supervision of Mr. T. Hardy, of Cardiff.

THE TEES AND HARTLEPOOLS.

Ropner & Sons, Stockton-on-Tees.

FALLS CITY. October 17th. Steel screw steamer, 392 ft. long, built to the highest class in the British Corporation Registry. Built to the order of Messrs. W. R. Smith and Sons, of Cardiff, and has double bottom for water ballast on the cellular principle, and in fore and after peaks. The engines will be of the triple-expansion type, of about 1,900 i.h.p., taking steam from two steel boilers.

Richardson, Duck & Co., Ltd., Stockton.

DALEHAM. October 28th. Steel screw steamer. Dimensions: Length overall about 423 ft. 6 in., breadth extreme 55 ft., depth moulded to shelter deck 34 ft. 10 in., with a deadweight carrying capacity of about 8,400 tons. This vessel, which has been built to the order of the London and Northern Steamship Co., Ltd., of London (Messrs. Pyman Bros., Ltd., managers), will class 100 A1 in Lloyd's Register, and has been built under special survey. She has two complete decks of steel, *viz.*:—Shelter and upper decks, 'tween-decks being 8 ft. high. There are no beams in holds, nor quarter pillars in holds or 'tweendecks. A steel centre division is fitted in holds clear of hatchways, wood shifting boards being fitted in way of hatchways, also in tweendecks, with the necessary feeders to obtain the Board of Trade certificate of exemption from bagging. Hatchways are extra large to expedite loading and discharging. Extra large and roomy accommodation for captain, officers, engineers and apprentices is provided in steel deckhouses on shelter deck, and there is a charthouse and wheelhouse above midship saloon house with flying bridge on top of same, and also room for wireless telegraph installation. Petty officers and sailors are berthed in shelter deck 'tweendecks forward, firemen aft—messrooms, washhouses and shower baths being provided for them. The vessel is fitted with a steel bulwark amidships from fore end of saloon house to after end of engineers' side houses. A steel bulwark is also fitted from fore hatch to stem. A cellular double bottom for water ballast is fitted throughout. Vessel has also peak tanks and equipment includes ten steam winches, derrick tables and crosstrees on masts, two derrick posts, ten derricks, steam windlass with quick-warping ends, steam-steering gear, stockless anchors, and specially large inventory and outfit. The engines by Messrs. Blair & Co., Ltd., have cylinders 27 in., 44½ in., 73 in. by 54 in. stroke, steam being supplied by three large single-ended boilers and an auxiliary boiler, having a working pressure of 180 lbs. A complete installation of electric lighting for accommodation, navigation and cargo purposes is fitted. The vessel has been built under the superintendence of Mr. R. T. Rutherford, the owners' superintendent.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

TASCALUSA. October 30th. Steel screw steamer, built to the order of the Tank Storage and Carriage Co., Ltd., of London, to fulfil the owners' requirements for their extensive oil-carrying trade. The vessel is being built on the Isherwood longitudinal framing system to class 100 A1 at Lloyd's and is of the two-deck type, with poop, bridge and forecastle. Her principal dimensions are 434 ft. by 54 ft. 6 in. by 32 ft. 8¼ in. moulded and she will have a carrying capacity of about 9,250 tons on a light draught of water. The vessel has ten holds, divided by centre bulkhead, making twenty tanks for the carriage of oil in bulk, and cargo hold forward. She will also have ten summer tanks in the 'tween decks at each side for the carriage of light oil. Oil bunkers will be carried in a deep tank forward and in cross bunker, giving a total capacity for oil of about three million gallons. Water ballast will be carried in cellular double bottom under engines and boilers and in fore and aft peaks. A large house on bridge deck amidships will contain saloon and accommodation for captain and officers, with deckhouse above containing smoking room, wireless room and charthouse, with wheelhouse on top. The engineers will be located in poop and the crew in forecastle. Insulated chambers will be provided for the ship's provisions and the steamer will have a very complete installation of electric light, while in the pump room amidships will be fitted a large pumping installation consisting of duplex oil pumps each capable of dealing with 300 tons per hour. For the purpose of communication, a wireless installation on the Telefunken principle will be fitted, and also the Willet-Bruce system of electric whistle control. Quadruple-expansion engines, placed aft, having cylinders 24 in., 35 in., 50½ in. and 73 in. by 51 in. stroke, supplied with steam by three large single-ended boilers working at 220 lbs. pressure, under Howden's system of forced draught, will be fitted by the North Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne. Oil fuel burning apparatus by the Wallsend Slipway and Engineering Co., Ltd., is fitted to the boilers. The hull and engines are being constructed under the superintendence of Messrs. Atkinson, Young & Robson, of Newcastle-on-Tyne and Liverpool.

Wm. Gray & Co., Ltd., West Hartlepool.

SCREW STEAMER. October 31st. Built to the highest class in Lloyd's Register, and of the following dimensions, *viz.*:—Length overall 331 ft. 6 in., breadth 46 ft. 6 in. and depth 23 ft. 5½ in., with long bridge, poop and topgallant forecastle. The saloon, stateroom, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom, and large after-peak ballast tank, six steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, shifting boards throughout and telescopic masts with fore and aft rig. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in. and 62 in. diameter,

with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

ROYAL TRANSPORT. November 14th. Built to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., Ltd., managers), London. Dimensions are 400 ft. length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 6,000 tons on a moderate draught. She is built to British Corporation classification, having a single deck of steel with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout the holds, according to the latest Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting back into a tank in the engine room, and twelve derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. The captain, officers and engineers are berthed in large houses amidships and the crew and firemen in the forecastle. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, consists of a set of Richardson's standard triple-expansion engines, having cylinders 25 in., 40 in. and 68 in. by 48 in. with three large boilers working at a pressure of 180 lbs. per square inch. The condenser is of the Contraflo type, with temperature regulator and the engine room auxiliaries include a cascade feed-water heater and filter, a Morison evaporator, large ballast donkey and harbour feed pump, etc.

Wm. Harkess & Son, Ltd., Middlesbrough.

SUFFOLK COAST. October 28th. Steel screw steamer, 195 ft. long, built to the order of the Powell, Bacon and Hough Lines, Ltd., of Liverpool. The vessel is designed with large cubical capacity to carry 1,000 tons on very light draught. She has extra large self-trimming hatchways and clear holds, and is fitted with heavy deck machinery of modern type for the quick handling of cargoes. Her engines will be capable of driving her at a speed of 10½ knots loaded.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

BERYL and OKINO. November 15th. Two steel screw trawlers, the principal dimensions being respectively 121 ft. 8 in. B.P. by 22 ft. by 13 ft. and 119 ft. B.P. by 22 ft. by 12 ft. 9 in. The first vessel has been built to the order of the Kingston Steam Trawling Co., Ltd., Hull, and will be fitted with triple-expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull. The second vessel has been built to the order of Mr. H. L. Taylor, Grimsby, and is to be fitted with triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull.

ONYX and AGATE. October 30th. Two steel screw trawlers, the principal dimensions being 121 ft. 8 in. by 22 ft. by 13 ft. moulded. The vessels have been built to the order of the Kingston Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

MALATIAN. November 10th. Built to the order of the Ellerman Lines, Limited, and intended for their passenger, grain and general trades. Dimensions: Length 323 ft. 0 in., breadth 42 ft. 2½ in. moulded, depth 26 ft. 0 in. moulded. Constructed of steel throughout to Lloyd's 100 A1 class, special survey, and to the latest requirements of the Board of Trade, including Suez Canal and grain carrying certificates and the new life-saving appliances rules. The vessel is arranged with erections consisting of long poop and forecastle, and is designed for carrying a large quantity of water ballast in cellular double bottom, also having a graceful stern of the cruiser type designed by Mr. A. Dalrymple (Ellerman Lines, Ltd.), in conjunction with the builders. The vessel has five large cargo hatchways, two steel masts and two derrick posts arranged with fourteen derricks and six powerful steam winches for the speedy handling of cargo, also an up-to-date steam windlass. The steam-steering gear is placed in a house abaft the engine casing, and the hand-steering gear on poop deck. Commodious accommodation is provided for 1st-class passengers amidships. A deckhouse erected at the forward part on poop deck encloses a handsome lounge and state-rooms. A large dining saloon is situated on the upper deck, having access from the deck house immediately above. In the vicinity of the saloon numerous state-rooms are located, with an extensive arrangement of lavatories adjoining. A spacious smoking room is also provided on the poop deck for the convenience of passengers. A system of steam heating will be fitted in all the cabins. The captain's cabin and chart room are arranged in a house on bridge. The officers and engineers are berthed in side houses abreast the engine casing and the petty officers and crew in forecastle. A complete installation of electric lighting and bells has been arranged. The machinery consists of a set of triple-expansion engines having cylinders 20¾ in., 35¾ in. and 60 in. diameter by 42 inches stroke, steam being supplied by three large single-ended cylindrical boilers working with Howden's forced draught and at a pressure of 215 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. A. Dalrymple, Ellerman Lines, Ltd.

NORTH-WEST OF ENGLAND.

R. Williamson & Son, Workington.

VOLANA. October 16th. Steel screw steamer, for Liverpool owners, of the following dimensions:—Length 175 ft., breadth 27 ft., depth moulded 13 ft. 4 in., and is designed to carry about 750 tons d.w. on Lloyd's freeboard. The vessel is built to the highest class at Lloyd's and will be propelled by triple-expansion engines having cylinders 14 in., 24 in., and 40 in. diameter by 27 in. stroke, steam being supplied by a cylindrical steel boiler 14 ft. 6 in. diameter by 10 ft. long working at a pressure of 180 lbs.

LAUNCHES—Scotch.

Ailsa Shipbuilding Co., Troon.

ORIOLE. November 12th. Screw steamer built for the General Steam Navigation Co., London. The moulded dimensions of the vessel are:—Length, 260 ft.; breadth, 38 ft.; and depth, 17 ft. She is of the sheltered-deck type, and will carry a deadweight of 1,700 tons. The machinery, supplied by the builders, will give a speed of 12 knots.

Charles Connell & Co., Scotstoun.

DISCOVERER. October 18th. Steel screw steamer of about 5,500 tons gross, built to the order of Messrs. T. and J. Harrison, Liverpool. The vessel has been built to Lloyd's highest class, and is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines with all the latest improvements are being supplied by Messrs. Dunsmuir & Jackson, Govan. Messrs. Matthew Keenan & Co., are covering the boilers and pipes with their patent non-conducting composition.

Robt. Duncan & Co., Port Glasgow.

ARDGORM. Screw steamer built to the order of Messrs. Lang & Fulton, Greenock. Dimensions:—405 ft. in length, 53 ft. in breadth, 30 ft. in depth, of 5,119 tons gross, and 8,400 tons deadweight. She is a sister ship to the *Ardgair*, launched by Messrs. Duncan earlier in the year. The engines will be supplied by Messrs. J. G. Kincaid & Co., Greenock.

Russell & Co., Port Glasgow.

KELVINIA. October 20th. Steel screw steamer built for Messrs. John Black & Co., Glasgow. This vessel, which has been constructed to the highest class at Lloyd's, is of the following dimensions:—Length, 405 ft.; breadth, 52 ft. 3 in.; depth, 30 ft., with a gross tonnage of 5,000.

Dunlop, Bremner & Co., Port Glasgow.

GUIDO. November 4th. Screw steamer built for the

Wilson Line's general cargo trade. The vessel is 310 ft. in length, 44 ft. 8 in. in breadth, 20 ft. 4 in. in depth, and of about 2,100 tons gross. She will be supplied by the builders with triple-expansion engines having cylinders 22½ in., 38 in. and 62 in. in diameter respectively, and a stroke of 42 in., and supplied with steam by two large single-ended boilers. This is the fifth vessel which has been launched by Messrs. Dunlop, Bremner & Co. for Messrs. Wilson during the past fifteen months.

Fleming & Ferguson, Paisley.

HOPPER STEAMER. November 12th. 1,200 tons, built to the order of the Clyde Lighthouses Trustees. The vessel is one of two sister ships which the firm are building for the same owners.

Harland & Wolff, Ltd., Govan.

ALCANTARA. October 30th. Large mail and passenger steamer constructed for The Royal Mail Steam Packet Co. Dimensions, nearly 600 ft. long by 67 ft. beam, and about 15,600 tons gross. She is a triple screw vessel, and will have a combination of reciprocating and turbine engines. Extensive refrigerating machinery will be fitted to meet the demands of the frozen and chilled meat trade. A noteworthy feature is the luxurious and commodious character of the passenger accommodation for all classes. A passenger lift will be fitted, serving five decks, and a gymnasium, barber's shop, dark-room for photography, cloak-room, enquiry office, and servants' rooms. The promenade decks will be spacious. The *Alcantara* will be employed in the Company's South American mail service, and will shortly be towed to Belfast to receive her machinery, which is being constructed in Messrs. Harland & Wolff's works there, where the vessel will be completed ready for sea. During construction the vessel has been under the superintendence of Captain G. M. Hicks, marine superintendent, and Mr. James E. Wimshurst, superintendent engineer.

Russell & Co., Port Glasgow.

PLUTARCH. October 13th. Built for Messrs. Lamport and Holt, Liverpool. The vessel is 423 ft. 4 in. in length, 56 ft. in breadth, and 31 ft. 3⅜ in. in depth moulded. She has been built to the highest class of the British Corporation, and is of about 6,000 tons gross. She is fitted throughout as a first-class cargo steamer for her owners' special trade. After the launch the vessel was towed to the Victoria Harbour, Greenock where Messrs. J. G. Kincaid & Co. will put on board her machinery. During construction the steamer was superintended by Captain Bird, marine superintendent, and Mr. J. Dall, superintendent engineer, assisted by Mr. E. Weaver and Mr. Goodall in their respective departments.

Scott & Sons, Bowling.

STEEL SCREW STEAMER. 350 tons, built to the order of Messrs. A. F. Henry & MacGregor, Ltd., shipowners, Leith, for their coasting trade. The machinery is being fitted on board by Messrs. Gauldie, Gillespie & Co., engineers, Glasgow.

Alex. Stephen & Son, Ltd., Linthouse.

TUBANTIA. November 15th. Built for the Koninklyke Hollandsche Lloyd, of Amsterdam. The vessel is a sister ship of the s.s. *Gelria*, recently delivered to the owners by the same builders, and which is now on her maiden voyage to South America. Dimensions: Length 560 ft., breadth 66 ft., depth 39 ft., and gross tonnage over 14,000. In her internal arrangements, decorations and fittings the steamer possesses all the unique and attractive features which characterised the *Gelria* and aroused such interest in shipping circles. The engines, also constructed by Messrs. Stephen, are of the quadruple-expansion type, supplied with steam from three double-ended and six single-ended boilers fitted with Howden's forced draught. Messrs. Matthew Keenan and Co., have the contract to cover the boilers and pipes with their patent non-conducting composition.

Swan & Co., Maryhill, Glasgow.

ANDALUSIA. 400-tons screw steamer, owned by Messrs. Mories, Munro & Co., and a consort to the *Colina*, lately launched by the same builders, will be employed in the Spanish trade. The boat will be engined at Bowling by Messrs. Forrest & Barr, Port Dundas.

LAUNCHES—Irish.

Dublin Dockyard Co., Dublin.

FISHERY CRUISER. October 18th. The second of the two fishery cruisers which were ordered from them by the Canadian Government for the protection of fisheries on the Pacific Coast, and for hydrographical purposes. The vessel is a sister vessel of the *Malaspina*, launched in July last, and now at Esquimault, B.C., which is the base from which the vessels will operate. The dimensions of the vessels, which have been built to the highest class in Lloyd's Register, are:—Length between perpendiculars, 162 ft.; breadth (moulded), 27 ft., and depth (moulded), 13 ft. 11 in. The machinery will be supplied by Messrs. David Rowan & Co., Glasgow, and the vessel will have a speed at sea under working conditions of 14¾ knots. The two vessels have been built under the superintendence of Mr. R. L. Newman, of Montreal, consulting naval architect to the Canadian Government, and Mr. F. L. Warren, of London.

Workman, Clark & Co., Ltd., Belfast.

STAR OF VICTORIA. November 13th. Twin screw, launched from the North Yard, and built for the Star Line of steamers owned by Messrs. J. P. Corry & Co., London. Dimensions: 516 ft. in length, with a gross tonnage of about 11,500, shelter-deck type and built under special survey for the highest class in Lloyd's Registry of Shipping, besides complying with the Board of Trade requirements for a first-class passenger and cargo steamer. She is specially designed and constructed for the trade between Great Britain and the Australian and New Zealand Colonies. Comfortable accommodation for a number of saloon passengers has been arranged in state-rooms adjoining the dining saloon in the midship deckhouse. The upper 'tween deck spaces have been designed and constructed so that they can be readily adapted for the accommodation of about 850 third-class passengers. These passengers will be berthed in large well-lighted rooms fitted with iron berths and washbasins, while suitable dining spaces, smoking and sitting rooms, also ample lavatory spaces, have been arranged. Boat accommodation is provided in excess of the Board of Trade requirements, and the boats can be easily handled by means of Welin davits. The cargo space is divided into six holds, four of which are insulated for carrying chilled and frozen meat cargoes, while a large portion of the after main 'tween decks is fitted as insulated chambers for perishable stores and dairy produce. For the preservation of these cargoes an extensive plant of refrigerating machinery, on the carbonic-acid system, has been arranged. For the protection of the vessel against fire the "Rich" system of fire detection and extinction has been installed, by means of which an outbreak of fire in any of the cargo spaces is at once indicated in the chart-room, and can be effectively dealt with by the officer on watch, without the necessity of leaving the flying bridge. After the launch the vessel was taken to the crane to receive her machinery which has been constructed by the builders. The engines and boilers are of large capacity capable of driving the vessel 13 knots fully loaded.

TRIAL TRIPS.

Craig, Taylor & Co., Ltd., Stockton.

PENISTONE. November 14th. Built for Messrs. Charles Radcliffe & Co., Cardiff. During the whole of the trip everything worked with the greatest smoothness, and over a series of runs the vessel maintained an average speed of 11¾ knots. Immediately after the trial the vessel proceeded to Blyth under command of Captain Williams. For Launch see November issue.

Wm. Gray & Co., Ltd., West Hartlepool.

PENMORVAH. October 29th. Built for Mr. Richard B. Chellew, of Truro. The performance of ship and machinery gave entire satisfaction to all concerned, the average speed obtained being 12¼ knots. The vessel afterwards proceeded to the Tyne to load. For Launch see November issue.

ORNA. November 5th. Built for The British India Steam Navigation Co., Ltd., of London, and to the highest class in Lloyd's Register. Dimensions:—Length over all, 302 ft., breadth 51 ft. 6 in., and depth 30 ft. The vessel has two decks laid, and poop, long bridge and topgallant forecastle, tasteful cabin accommodation in houses on the bridge

deck for passengers, captain and officers, the crew's berths being in the forecastle. An electric light installation is fitted throughout. A cellular double bottom and after-peak tank, and in addition a deep tank or hold compartment, are fitted for water ballast abaft the engine room, having a total capacity for water ballast of about 2,000 tons. The whole of the outfit, including sanitary tanks, fresh-water distiller, steam windlass, steam-steering gear, two derricks, to lift 30 tons each, twelve steam winches with return exhaust to winch condenser of the Contraflo type, are of the most approved description. The machinery has been built by the Central Marine Engine Works of the builders, and is of the triple-expansion type, having cylinders, 28 in., 46 in., and 77 ins. diameter, and a piston stroke of 48 ins. She is fitted with a complete outfit of auxiliaries, including feed and ballast pumps, evaporator, etc., all of the "Cmew" type, Contraflo main condenser, Weir's feed pumps and heater, and three large steel boilers working by Howden's system of forced draught at a pressure of 180 lbs. per square inch. The owners were represented by Captain G. Hodgkinson, R.N., Mr. J. Clark and Mr. Isdale. A very satisfactory trial was effected, a speed of 14 knots being obtained; the vessel afterwards proceeded to Middlesbrough to load.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

TANIS. October 20th. Built for The Moss Steamship Co., Ltd. (Messrs. James Moss & Co., managers), Liverpool. Dimensions are 362 ft. by 51 ft. ½ in. by 26 ft. 3 in. depth moulded, having a deadweight carrying capacity of about 6,600 tons. She is built to Lloyd's highest class on the shelter-deck principle, having two complete steel decks, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames without side stringers, giving exceptionally clear holds for the stowage of bulky cargoes; wood grain divisions are fitted throughout to Board of Trade requirements, and the vessel is divided into seven watertight compartments by six transverse bulkheads. Four large hatches are provided with nine powerful steam winches worked from a multitubular donkey boiler and exhausting to a winch condenser, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick-warping steam windlass is fitted forward, and steam-steering gear amidships with hand screw gear aft. The vessel is fitted with electric light, and accommodation for the captain, officers and engineers is arranged in houses amidships fitted with steam heating, the crew and firemen being berthed in the forecastle. The ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of Richardsons' standard triple-expansion engines with cylinders 25 in., 40 in. and 67 in. by 45 in. stroke and two large boilers working under natural draught at a pressure of 180 lbs. per square inch. The condenser is of the Contraflo type with air pump, temperature regulator, and the engine room auxiliaries include a Cascade feed-water heater and filter, a Morison evaporator, large ballast donkey, and harbour feed pump, etc. Throughout the trial the engine and all auxiliaries worked splendidly, a speed of 12½ knots being attained on the Whitley Bay measured mile, the vessel afterwards proceeding to Sunderland to load.

ORLOCK HEAD. October 25th. The trials in every way were entirely satisfactory, a speed of 11 knots being attained, and the vessel afterwards proceed to Middlesbrough to load. The vessel has been built for the Ulster Steamship Co. For Launch see November issue.

IMPERIAL TRANSPORT. November 8th. Built to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., Ltd., managers), London. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12 knots being attained, and the vessel afterwards proceeded on her voyage to Narvik. For Launch see November issue.

Smith's Dock Co., Ltd., South Bank-on-Tees.

MYOLA. Has just completed a very successful trial. The vessel has been built to the order of Messrs. Howard Smith Company, Ltd., Melbourne, for the Australian coastal trade. Her dimensions are 180 ft. by 29 ft. by 14 ft., and she carries 750 tons. The engines are of the triple-expansion type, having cylinders 16½, 27 and 44 in. by 30 in. stroke, and were constructed by the builder.

Sunderland Shipbuilding Co., Ltd., Sunderland.

HARBURY. October 23rd. The trial proved very successful in spite of the bad weather, the highly satisfactory mean speed of 13¾ knots being obtained. The owners' representatives, Messrs. Crandell & Short, by whom the steamer has been inspected during construction, expressed themselves as being very pleased with the smooth working of all the machinery, and the fine performance of the ship. For Launch see November issue.

J. L. Thompson & Sons, Ltd., Sunderland.

DEN OF EWNIE. Built to the order of Messrs. Charles Barrie & Sons, Dundee. Recently completed her official trial trip, a mean speed of 12¾ knots being easily maintained on the measured mile trials. Dimensions—Length, 403 ft. 5 in. by breadth extreme 54 ft. 2 in. by depth 36 ft. 7½ in. Constructed to Lloyd's highest class, on the single-deck rules, and with a complete shelter deck right fore and aft. Water ballast will be carried in the cellular double bottom and in the fore and after peaks. The engines and boilers have been supplied by Messrs. John Dickinson & Sons, Ltd., the sizes of the cylinders being 27½ in., 44½ in., 74 in by 48 in. stroke, supplied with steam by three large boilers working at 180 lbs. pressure.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend.

H.M.S. LYSANDER. Ocean-going torpedo boat destroyer has successfully completed a series of trials at sea, and is now receiving her finishing touches and having the engines inspected, after which she will be ready for acceptance by the Admiralty. For Launch see September issue.

Sir W. G. Armstrong, Whitworth & Co., Walker-on-Tyne.

SAN URBANO. November 14th. Petroleum steamer taken to sea for trial trip, built to the order of the Eagle Oil Transport Co., Ltd., of London. On the trial trip the machinery gave every satisfaction, and a mean speed of 12 knots was attained. For Launch see November issue.

Robt. Thompson & Sons, Ltd., Southwick.

ELLERDALE. October 28th. Built for Messrs. Thos. Smailes & Son's Steamship Co., Ltd., of Whitby. The vessel was fully loaded and the trial most successful, the engines working splendidly, a mean speed of 10 knots being easily attained, and Mr. Geo. Smailes, on behalf of the owners, expressed entire satisfaction with the vessel and machinery. The vessel afterwards proceeded to Genoa under the command of Captain Kirby. For Launch see November issue.

Harland & Wolff, Ltd., Govan.

MARYLAND. November 1st. Built at Govan, for the Atlantic Transport Line, left Belfast, and, after satisfactory trials proceeded to London, Captain S. W. Watkins being in command of the vessel. For Launch see November issue.

Ailsa Shipbuilding Co., Troon.

IRRAWADI. A new passenger and cargo steamer, built for the Bombay Steam Navigation Company. The official trials on the Clyde were highly satisfactory, the speed on the measured mile being 11¼ knots, which was considerably in excess of the contract requirements. The engines have been supplied by Messrs. Dunsmuir & Jackson, Glasgow.

Bow, M'Lachlan & Co., Paisley.

J. OSWALD BOYD. Twin-screw oil carrier, built for the Petroleum Carriers, Ltd., Glasgow. The trials were in every respect satisfactory, the speed exceeding the contract requirements. For Launch see November issue.

Geo. Brown & Co., Greenock.

KINGFISHER. October 27th. Built for the General Steam Navigation Company, London, ran loaded trials on the Clyde, attaining a mean speed in excess of the contract. She was afterwards handed over to her owners. The *Kingfisher* will take up service on the London, Yarmouth, and Lowestoft route. For Launch see November issue.

D. & W. Henderson & Co., Ltd., Partick.

NORTONIAN. November 11th. Built to the order of Messrs. Frederick Leyland & Co., Ltd., Liverpool. The trials on the Firth of Clyde proved quite satisfactory. For Launch see November issue.

Scott's Shipbuilding and Engineering Co., Ltd., Greenock.

ALAUNIA. November 10th. Built for the Cunard Company. The trials run on the Firth of Clyde were satisfactory

in every respect, and the vessel left in the evening for Liverpool, where her fitting-out will be completed. For Launch see July issue.

Napier & Miller, Old Kilpatrick.

BRITISH MONARCH. November 12th. Built to the order of the Monarch Steamship Co., Ltd. Dimensions :— Length, 240 ft. ; breadth, 54 ft. ; depth, 31 ft. 6 in. Trial trip run on above date. For Launch, see November issue.

Barclay, Curle & Co., Ltd., Whiteinch.

CITY OF CORINTH. November 13th. Built for the Ellerman Line, Ltd. Dimensions :—Length, 430 ft. 6 in. ; beam, 55 ft. 3 in. ; depth, 32 ft. 1 in. Trial trip run on above date. For Launch, see November issue.

Wm. Denny & Bros., Dumbarton.

EMPRESS EKATERINA II. Built for the Russian Steam Navigation and Trading Co., Odessa. This vessel has recently been under speed trials between Cloch and Cumbrae. During the nine hours' official trial a mean speed of 15·18 was developed.

Workman, Clark & Co., Ltd., Belfast.

PHEMIUS. November 15th. Built for the Ocean Steamship Co., Ltd., Liverpool (Messrs. Alfred Holt & Co.). Left Belfast Harbour and proceeded to Carrick Roads for adjustment of compasses, machinery tests and trial trip. The results attained were highly successful, and the vessel afterwards left for Newport prior to proceeding to Birkenhead to complete cargo for the initial voyage to China and Japan. For Launch see July issue.

MESSRS. JAMES CARR & Co., of 35, Queen Victoria Street, London, E.C., will be pleased to supply copies of their catalogue, relating to their milling cutters, reamers, gauges, etc. The Catalogue is well illustrated.

REINFORCED METAL LTD., of 175, West George Street, Glasgow, have issued a pamphlet on re-inforced metal construction which deals fully with the method of steel and concrete construction known as re-inforced metal.

MESSRS. ISAAC STOREY & SONS, LTD., of Manchester, have recently issued a catalogue on their Air Compressors (C. H. Scott's patent) which contains lengthy explanatory matter and illustrations.

MESSRS. CAMMELL, LAIRD & Co., LTD., have sent us their recently published catalogue of tool steel, which is splendidly produced and deals with their high-speed steels, best cast tool steels, mining steels and shear steels. The object of this catalogue is to assist the selection by the buyer of the steel most suitable for the work required of it. The book has been carefully prepared and should be of considerable assistance to buyers.

MR. FAIRBROTHER, of Messrs. Bromhead & Co., has recently issued an abridgement of the patent laws and rules of Great Britain, her chief Colonies and all the principal countries of the world. The book has been compiled with an eye to simplicity and is available at small cost. The countries are arranged in alphabetical order, and the information given, ready and convenient, concerns the essential facts connected with the patent laws.

LLOYD'S REGISTER. WRECK STATISTICS FOR 1912.—The statistical summary of vessels totally lost, broken up, condemned, etc., now published by Lloyd's Register, shows that, during 1912, the gross reduction in the effective mercantile marine of the world amounted to 720 vessels of 748,965 tons, excluding all vessels of less than 100 tons. Of this total, 379 vessels of 572,745 tons were steamers, and 341 of 176,220 tons were sailing vessels.

BOARD OF TRADE EXAMINATIONS.

SEPTEMBER 25th, 1913.—LONDON.—*1st Class :* A. Campbell, H. Jack, A. Webb, G. Wharton. *2nd Class :* R. Collen, W. Fisk, A. Parkin, J. Spence, M. Waight.

HULL.—*2nd Class :* W. Milburn, G. Whitworth.

NORTH SHIELDS.—*1st Class :* N. Wilson. *2nd Class :* M. Cockshott, G. Stockport, S. Wood.

SUNDERLAND.—*1st Class :* G. Crombie, H. Johnson, W. Shiells. *2nd Class :* H. Humble, R. McCall, W. Strutt, R. Wilson.

BRISTOL.—*1st Class :* W. Crowley. *2nd Class :* T. Allen, H. Giblett, F. Jaques, E. Pearson, E. Phelps.

LIVERPOOL.—*1st Class :* A. Owen, H. Scharffetter, F. Unsworth, *2nd Class :* W. Bann, J. Fletcher, C. King, A. Luty, W. Prophet, H. Qualtrough.

GREENOCK.—*1st Class :* G. Irvine, K. McInnes, E. Pearne, R. Sayers, J. Scott, D. Smith. *2nd Class :* W. Broom, A. Macleod, J. Pemberton, J. Russell.

ABERDEEN.—*1st Class :* A. Murrey. *2nd Class :* J. Aitken, A. Craigmyle, J. Ford, J. Horn, A. Miller, G. Milne, J. Mollison, J. Murison, W. Shand.

OCTOBER 2nd, 1913.—LONDON.—*1st Class :* W. Campey, P. Pennefather, G. Spears, H. Turner. *2nd Class :* J. Smith.

SOUTHAMPTON.—*1st Class :* R. Burton. *2nd Class :* H. Cooper, A. Reed, D. Robbie.

GLASGOW.—*1st Class :* A. Clyne, G. Duncan, A. Miller, A. Paterson. *2nd Class :* R. Giles, T. Jolly, W. Mitchell, C. Noble, J. Rogerson.

CARDIFF.—*1st Class :* C. Chubb, A. Powell, T. Williams. *2nd Class :* R. Haworth, R. Parry.

FALMOUTH.—*1st Class :* S. Pidsley. *2nd Class :* W. Clyburn.

LIVERPOOL.—*1st Class :* L. Davey, B. Duff. *2nd Class :* J. Cormack, A. Huddart, A. Hughes, J. Innes, L. Jackson, V. Mangham.

LEITH.—*1st Class :* P. Brown. *2nd Class :* R. Bell, T. Brodie, J. Fyffe, W. Fyffe, C. Johnson.

NORTH SHIELDS.—*1st Class :* G. Allison, H. De Redder, J. McClelland, G. Younson. *2nd Class :* S. Brodie, T. Dobson, D. Mackay, C. Miller, J. Olsen, A. Winter.

BELFAST.—*1st Class :* J. O'Neill. *2nd Class :* J. Kearney.

OCTOBER 9th, 1913.—LONDON.—*1st Class :* R. Andrews, W. Mackenzie, C. Newton. *2nd Class :* J. Ferguson.

NORTH SHIELDS.—*1st Class :* Q. Bell, J. Clark, T. Godfrey, E. Gordon, W. Kay, H. Lamb, W. Weddell. *2nd Class :* E. Crawford, T. Miller, D. Peel, R. Plane, H. Porteous.

LIVERPOOL.—*1st Class :* H. Armstrong, F. Callow, W. Wood. *2nd Class :* S. Backhouse, F. Bailey, A. Eley, M. Hoare, R. Mayo, M. Owen.

GLASGOW.—*1st Class :* T. Smith. *2nd Class :* G. Brodie, D. Cumeron, R. Innes, W. Thorburn.

OCTOBER 16th, 1913.—LONDON.—*1st Class :* F. Linff, A. Sugden. *2nd Class :* F. Cowling, W. Dixie, E. May.

HULL.—*1st Class :* A. Stanforth, T. Woodhouse, *2nd Class :* J. Charlesworth, P. Harvey, G. Hickman, J. Miller, E. Richardson, G. Surfleet.

DUNDEE.—*2nd Class :* S. Murray.

GREENOCK.—*1st Class :* J. Black, G. Cormack, J. Henderson. *2nd Class :* R. Jones, P. McFarlane, J. McKenzie, C. McMillan, J. Robson, J. Slack.

LIVERPOOL.—*1st Class :* F. Goetzee, S. Grundy, W. Hill, H. Hughes, W. Hughes, W. Thomas. *2nd Class :* T. Booth, A. Harrison, J. Holliday, R. Howatt, J. Weldon.

NORTH SHIELDS.—*1st Class :* W. Ashton. W. Baird, J. Brammall, J. Hollingsworth, J. Hope. *2nd Class :* J. Christie, J. Pearson, J. Robson, W. Sheffield, C. Simpson, H. White.

DUBLIN.—*1st Class :* J. Legg.

OCTOBER 24th, 1913.—LONDON.—*1st Class :* H. Halse, H. Humphreys, F. Sanders. *2nd Class :* A. Owen, R. Shepherd, J. Thom.

GLASGOW.—*1st Class :* T. Chalmers, A. Henderson, R. Jacobsen, J. Ross, W. Steven, W. Stevenson. *2nd Class :* J. Armour, J. Brown, S. Brunsdon, J. Gibbon, A. Kyle, H. McInnes, R. McIver.

CARDIFF.—*1st Class :* M. Edwards, C. Rowles, V. Skinner, A. Watkins. *2nd Class :* J. Friend, W. Powell, W. Sparkes, G. Tottle, E. Volk.

LIVERPOOL.—*1st Class :* E. Richardson, W. Savage. *2nd Class :* J. Florey, G. Harrison, A. Sedden.

NORTH SHIELDS.—*1st Class :* N. Dawson, G. White. *2nd Class :* H. Baty, P. Berry, F. Ingram, J. McBain, T. Milne, J. Pillar, R. Quaintance.

SOUTHAMPTON.—*1st Class :* F. Harvey. *2nd Class :* G. Bullock.

WEST HARTLEPOOL.—*1st Class :* T. Pryse. *2nd Class :* R. Wilkinson.

LEITH.—*1st Class :* A. Cockburn, G. Gray, T. Scotland, W. Thomson. *2nd Class :* W. Hogg.

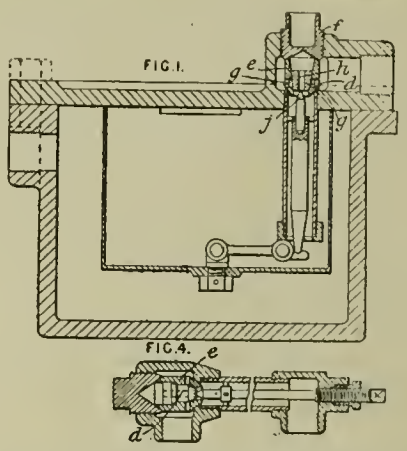
PLYMOUTH.—*2nd Class :* H. Jackson, J. Thompson.

October 30th, 1913.—LONDON.—*Extra 1st Class:* J. Paterson. *2nd Class:* N. Cowell, A. Gibson, L. Morgan, W. Roser, C. Tye, C. Weston.
GLASGOW.—*Extra 1st Class:* A. Malcolm, A. Wallace.
SOUTHAMPTON.—*2nd Class:* J. Pratt.
BRISTOL.—*1st Class:* F. Phillips, *2nd Class:* H. Preston.
GREENOCK.—*1st Class:* A. Ledingham, W. Lewis, C. Macleod. *2nd Class:* A. Brownlie, A. Hillhouse, W. Simptlaw, A. Venters.
NORTH SHIELDS.—*1st Class:* G. Kyles, W. Murray, K. Swinbanks. *2nd Class:* F. Crowell, M. Patrick, J. Smith.
CARDIFF.—*Extra 1st Class:* J. Truscott.
LIVERPOOL.—*1st Class:* T. Hendry, R. Roberts. *2nd Class:* H. Charnock, R. Donaldson, H. Harris, G. Shallcross, E. Toolan.
SUNDERLAND.—*1st Class:* T. Birch, G. Taylor, A Whyte. *2nd Class:* A. Atkinson, J. Bertram, W. Crombie, A. Hind, S. Hutchinson.
LONDONDERRY.—*2nd Class:* D. Grey, D. Murray.
ABERDEEN.—*1st Class:* A. Millar. *2nd Class:* C Douglas, W. Hutchinson, F. Jamieson, G. Keith, J. Melvin, J. Stewart, A. Wellwood.
HULL.—*2nd Class:* R. Barr, A. Butler, A. Vivian.
November 6th, 1913.—LONDON.—*1st Class:* G. Stent. *2nd Class:* S. Bowden, R. Caton, T. Hill, W. Mann, C. Pring, W. Roberts, G. Taylor, H. Wood.
BELFAST.—*2nd Class:* R. Ester.
LEITH.—*2nd Class:* A. Brotchie, R. Livingstone, T. McDonald, G. Smith.
GLASGOW.—*1st Class:* T. Clark, C. Coleman, A. Fraser, A. Thomson. *2nd Class:* J. Canning, W. Eagleson, H. Gilmour, J. Glen, R. MacLean, H. Paterson, J. Taylor, H. Wilson.
LIVERPOOL.—*1st Class:* J. Cartwright, S. Davis, C. McGhee, W. Wigglesworth. *2nd Class:* F. Connoly, J. Edmondson, O. Jones, P. Meredith, J. Peters.
NORTH SHIELDS.—*Ex. 1st Class:* T. Morgan. *1st Class:* F. Canning, J. Digney, R. Downie, R. Hill, W. Riches. *2nd Class:* H. Fairbank, G. Haddock, E. Klotz, F. McQueen, J. Mordlee, J. Sadler.
SOUTHAMPTON.—*1st Class:* C. Methven. *2nd Class:* C. Macpherson, F. Suter, J. Woodward.
CARDIFF.—*1st Class:* E. Harrison. *2nd Class:* S. Morgan, J. Williams.
November 13th, 1913.—LONDON.—*1st Class:* W. Alltree, E. Davis, A. Dickson, D. Goodsir, G. Robinson, B. Tharp. *2nd Class:* T. Alexander, V. Davidson, W. Godfrey, M. Keyes, W. Wren.
HULL.—*1st Class:* L. Dimberline. *2nd Class:* G. Nicholson, G. Petch.
NORTH SHIELDS.—*1st Class:* R. Brown, E. Butchart, J. Jenkin, G. Penman, C. Scott. *2nd Class:* J. Bell, J. Brown, R. Macpherson.
DUBLIN.—*1st Class:* A. Jack.
LIVRPOOL.—*1st Class:* J. Ewart, C. Jainaga-Ercilla, H. Owen, W. Pearson, J. Robinson, G. Turner. *2nd Class:* J. Barnett, A. Clark, R. Grant, C. Griffiths, T. Owen.
GREENOCK—*1st Class:* J. Alexander, A. Anderson, J. Corrie, R. Cuthbertson, T. Hunter, P. Lyons, R. Monteith, F. Morris, W. Train. *2nd Class:* G. Cross, A. Tyre.
DUNDEE.—*2nd Class:* H. Alexander, J. Hood.

Abridgment of New Patents.

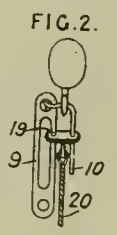
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

15,748. Steam Traps. In a steam or air trap or like apparatus, which may be of any type, but is shown in Fig. 1 as of the bucket type, the discharge valve comprises a conical plug *d*, having a passage *h* therethrough and fitting into a coned sleeve *e*, having outlet passages *g*. The valve is normally held on to its seat by the steam pressure, but on accumulation of water, a rod *j* rises, first closing the central passage *h* and then raising the valve slightly. The pressure above the valve is thus relieved, and the valve rises to the upper end of the sleeve *e*, where it is maintained by the



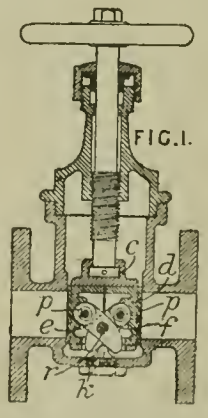
rush of water until all the water is expelled. In a modification, operated by a closed float, the valve moves horizontally, and a band-operated valve is added on the fitting *f* carrying the sleeve *e*. In an expansion trap, shown in Fig. 4, the valve consists of two coned parts joined by a cylindrical part *d* fitting loosely in the sleeve *e*. In a modification, the valve consists of one conical and one cylindrical part.

15,817. Boat-releasing Gear. A releasing-hook for ships' boats comprises a slotted link 9 secured at its lower end to the boat and attached to the lower pulley block by a pivoted



part 10, which is normally secured by a piece 19 sliding on the link 9. The fore and aft hooks are simultaneously operated from the central portion of the boat by pulling lanyards 20, which cause the piece 19 to slide off the hook 10.

16,008. Sliding Valves. Relates to sliding valves of the type having two parallel faces, and consists in mounting and guiding the two valve faces or members *d* in a tubular carrier *c* and providing toggle-links *e*, *f* engaging directly with the valve members and with the bottom of the valve



casing to force the valve members tightly against their seatings in the final closing movement. The links may be hinged to the valve members by pins *k* or may simply engage in sockets therein, and the ends of the links which project beyond the joint *r* may engage with a projection *k* on, or attached to, the bottom of the casing, or may slide on the flat bottom of the casing.

The Marine Engineer

And Naval Architect.

LONDON, JANUARY, 1914.

A REVIEW OF THE YEAR.

IN reviewing the prominent features of the past year, the diverse nature of marine engineering is very much in evidence, and the choice of main and auxiliary machinery is covering an ever-increasing range. For the largest units, the turbine holds the field; for medium powers, the decision lies between the direct and gear-driven turbine; for cross-channel and similar craft, the gear-driven turbine appears to the best advantage; beyond these the range is remarkable, it embraces direct and gear-driven turbine, triple and quadruple reciprocating, combination, Diesel, hot bulb, paraffin, petrol and gas motors, with a few examples of the interposition of electric and hydraulic drive. The stokehold has not the same variety, for although the water-tube boiler has been adopted in some instances, the Scotch boiler is still the mainstay, particularly in the ocean carrier. With the standard type of seven to ten-knot tramp, the boiler power is largely influenced by the beam of the vessel; forced draught, super-heating and feed heating, quadruple expansion and high vacuum have increased the available power so far; beyond this the three boiler arrangement imposes a limit which requires a larger stokehold, more attendance and reduction of cargo space. The comparatively slow introduction of oil fuel for steamers is co-existent with that of the Diesel engine, and is even more an effect of the uncertainty and cost of supplies than is the tardy progress of the internal combustion motor, for the latter is not yet so free from inherent defects as it may eventually become, and the first cost of an expensive construction is enhanced by the new equipment necessary in established works building steam engines. The stringency of supply may become easier as the large number of oil tank steamers recently built come into service, and as the development of shale and coal oil extraction expands. In passenger ships, particularly the large ocean liners, the tendency is more to add comfort, luxury and display, rather than strain after a still higher speed. It is recognised that abnormal speeds are expensive, although valuable as an advertisement,—and also, apparently, when encountering privateers or buccaneers, now that armed merchantmen have been introduced. The conversion of the ocean liner into a species of watering place or health resort, is not altogether to be deplored. The spread of luxury has induced a higher degree of comfort in the steerage and crew spaces, and has had a stimulating effect on the inventive and artistic purveyors in guiding them into rational paths. The papers read before the different Societies and the Exhibitions held under the various auspices have a high economic value, and assist in merging the valuable features of one industry into those of the others. Most of these having been reported in our columns, it remains but to note the advances in the mechanical arts and the more economical production of power there portrayed. As the cost of living continuously increases, so does it become necessary to increase the rate, or decrease the cost, of production, eliminating processes that are unnecessary and enhancing the value of unskilled labour by mechanical means. That unskilled labour tends to become lifeless and automatic, machine-like and monotonous, is only partly true, provided it be accompanied by leisure for developing the dormant faculties, particularly in countries where much is maintained by the rates, by state and private grants,—and where the administration may be judiciously carried out. It is pleasing to observe the amicable settlements which have been arrived at in the due recognition of service in the various departments, willingly accorded in many cases, with a considerable gain in mutual respect and without that loss resultant upon a conflict which has so often militated against adjustment of differences, while disabling production so far as to more than balance any sectional gain. That the toll of the sea is still large is much to be regretted; that it is in the nature of things is as true of earthquakes, mine explosions and street accidents, but in so far as any humanitarian principles can effect improvement, there is good reason to be satisfied with the trend of events, and the outcome of the International Conference may further improve conditions. Wireless telegraphy, higher speed, watertight compartments, double skins, life-saving appliances, fire extinguishers, and a more wholesale view of the matter have, no doubt, gladdened the hearts of the insurance societies if they have not reduced the premiums. The past year has not dealt too kindly with the engineering community in the removal from active service of quite a number of distinguished engineers, men whose influence extended over a generation, whose works remain as monuments of achievement, whose names will linger in the memory with those of Boulton and Watt. The opening addresses by the presidents of the various technical societies are generally looked to as a recapitulation of what has been accomplished and of what may be projected; when these take the form of an uplift of ideals, of a mental and moral stimulus, they stand like beacon lights over an uncharted course where too many rudderless ships are drifting with pilots that have lost their bearings.

This issue of the MARINE ENGINEER AND NAVAL ARCHITECT is published amid echoes which proclaim a season of good will, and we have pleasure in conveying to all with whom we have had association in the past our warmest greetings for the coming year; to those whom we hope to add to our list of friends and readers we extend our best wishes.

SEA TRAINING.

THOSE who have watched the work of the National Committee on Sea Training, under the stimulating guidance of the Chairman, Mr. Geoffry Drage, know well the value of the beneficent work carried on among a section of the community that are deserving of consideration, as well as from the national standpoint of recruiting the ranks of the British Mercantile Marine from a source of reliable material. It is interesting to note, in a letter over the signatures of the members of the Committee, that they have been successful in obtaining a grant of ten pounds per head per annum from the National Exchequer for sea training institutions, corresponding grants from local

education authorities, which the Committee have reason to hope will flow more freely in the future than in the past, and lastly, but by no means least, a standardized system of education and instruction, whereby any education authority, on taking up the subject of sea training, may have a rough model adaptable to the needs of their particular district. To this end the Committee have prepared a syllabus of both elementary and secondary education, suitable for use in schools in seaports and districts where such training is desired and appropriate, as well as in seamen's orphanages and in sea-training institutions. This scheme has been submitted to the Board of Trade, and a request is now made that such a syllabus shall be recognised in the class and district indicated, so as to give the boys whose parents desire it an early opportunity of becoming familiar with subjects connected with the sea and the calling of seamen. This seems a very reasonable as well as a very desirable request, particularly as similar steps have been taken with regard to other subjects; for example, in agricultural districts, such as Norfolk, an agricultural bias is given; in engineering districts, such as Leeds, an engineering bias; in some of the London areas an industrial bias, and in others a commercial bias has been given to the curriculum. Another subject in which the Committee desire the Board of Trade to vary the present conditions is in reference to the grants to shipowners who take trained boys to sea, to enable them to provide the separate accommodation and supervision which is generally acknowledged to be desired. It was pointed out at the recent very successful Conference on Sea Training that a subsidy is no longer pressed for by shipowners, who would be quite willing to substitute therefor the power to ship boys with a two-years' certificate of training from an approved sea-training institution in the same proportion to able seamen as ordinary seamen, with the concession that such boys should be allowed to qualify as able seamen after two years' service at sea, thus making four years' training in all. As was explained at the Conference, this scheme does away with the necessity of carrying two boys for one ordinary seaman, and would assist shipowners in providing separate accommodation, for the reason that they would know definitely how many boys they would have to take each voyage. It is pointed out that a similar qualifying allowance to that now asked for the deck boy in preliminary training, *viz.*, that of two years instead of three at sea, is already made in the case of officer cadets joining the Mercantile Marine from the *Conway* or the *Worcester*; there is, therefore, an excellent precedent for this concession. There are one or two other points which the Committee are pressing on the Board of Trade, but we feel sure that those set out above are quite sufficient for all those who are desirous of fostering our natural characteristics of seamanship to lend their influence towards the useful end that the Committee are doing such good work to bring about.

DATA BOOK FOR SHIPBUILDERS AND NAVAL ARCHITECTS.—This date book, compiled by Mr. Pio Agapito, Trieste, and reviewed in our columns last March, has now gone into a second edition. The publication, which is a very useful one and of convenient size, costs 2s. 10d. post-free.

MR. FRANCIS SOMERSCALES.

THE retirement of an old member from the staff of a well-known firm is always a matter of interest to those who have been associated with him directly or indirectly and the interest is enhanced by pleasant associations when that retirement comes before Nature demands immediate release from the cares and anxieties of business life. Mr. Somerscales retires under these happy circumstances, after a period of forty years' service with Earle's Shipbuilding and Engineering Co., Hull, and it is hoped that he will long continue to enjoy an active respite from the exactions of life—a respite which he has well earned. Entering the service of the firm as draughtsman, when wooden vessels were more frequently seen than now, Mr Somerscales has passed through an experience now almost unique. The conversion of a shipyard from the requirements of those days to those of the present time, involving as it has done, a complete revolution in processes and modes of construction, to meet the widely different classes of ships, has been no light matter for shipbuilders, the period of transition being full of strain and stress to all the heads of departments. As chief draughtsman and shipyard manager, much of this work fell to the share of the subject of our illustration, and his organizing ability brought him into the position of general manager. On the occasion of his retirement Mr. Somerscales was presented by those who were co-workers with him in the business of the firm with a very fine "grandfather clock" as a souvenir of their association with him. Born at Hull in 1844 Mr. Somerscales served an apprenticeship of seven years with one of the Hull shipbuilding firms. He joined the service of Earle's Shipbuilding and Engineering Co. in 1873 as ship draughtsman. After a time, in order to obtain sea experience, he spent two years at sea as ship's carpenter, returning to Earle's Co. in 1875 and filling in succession the position of chief draughtsman, naval architect and shipyard manager. When the works were acquired by the late Lord Nunburnholme, then Mr. C. H. Wilson, M.P., in 1901, Mr. Somerscales was appointed general manager, retaining that position until the present time. Mr. P. F. Nicholson, at present managing director of Messrs. Hawthorns & Co., Ltd., engineers and shipbuilders, Leith, will succeed Mr. Somerscales early in the new year.

ENGINEERS AND ENGINEERING IN THE ROYAL NAVY.

IN considering the subject of Engineers and Engineering in the Royal Navy the first to refer to is naturally the commissioned engineers. This most important class of officers numbers about 800, and consists of one engineer-in-chief, 12 engineer admirals, 19 engineer captains, 268 engineer commanders, 519 engineer lieutenants. Of this number it is pleasing to know that twenty-one have risen from the ranks of engine-room artificers. Regarding the entry of engineer officers, previous to 1903 a system obtained by which boys could enter the Navy as engineer cadets by means of an examination taken at the age of 14½ to 16½, and for the purpose of training cadets, Keyham College was set apart, and the potential engineer studied for about four years, his parents paying an annual fee of £40 plus expenses. Apart from the open method, a most important avenue of entry into this College was from the ranks of dockyard apprentices. For this purpose examinations were held periodically and a certain number of the top boys admitted at greatly reduced fees. To this system must be given the credit of placing in the premier service some of our foremost engineers.

The method of entry for commissioned officers which now obtains was initiated in 1903, and was the result of the finding of the Admiral Douglas Committee. It is a system of common entry; that is to say, all officers, whether deck, Royal marine or engineer, are entered by one common channel. For the purpose of entering cadets a Committee of Selection, presided over by the Secretary to the Admiralty, was formed, and before this committee appear the candidates between the ages of 13 years and 4 months and 13 years and 8 months. If selected by the committee as suitable they are set an examination, and on passing proceed to one of the training colleges. Osborne and Dartmouth are set apart and specially equipped for the training of these cadets. In each of the colleges the cadets spend two years, the training fees being £75 per year, and in addition the expense of books, clothes, washing, etc., are estimated at a further £40 per year. After leaving Dartmouth College the cadet joins a special training cruiser for about twelve months, and can then be made a midshipman and drafted to one or the other of the battleships of the Home Fleet. From the time he joins the training cruiser to the time he obtains the rank of sub-lieutenant, which would be about five years, his parents must make him an allowance of £50 per year, the minimum total cost to the parents of a naval officer being about £800.

During the period which has occurred between the stopping of the old scheme in 1903, and the useful results obtained from the new, a serious shortage of officers has occurred, to overcome which the Admiralty has decided to immediately grant lieutenancies to one hundred Naval Reserve officers, and they have also brought into being a temporary scheme of entry for cadets. A limited number of special cadets are to be admitted, at an age of about eighteen, to an open competitive examination, and those selected will enter the Navy on similar lines to the younger cadet. In addition to the above scheme it is intended to grant a certain number of commissions to men on the lower deck.

The duties carried out by the present class of commissioned engineers may be summarised as follows:—The engineers-in-chief and one or more of the engineer-admirals are attached to the Admiralty at Whitehall for various duties; other admirals are attached to dockyards in charge of the engineering departments and for general staff duties. The engineer-captains are also in charge of dockyard departments, fleets and repair ships. The engineer-commanders are placed in charge of the engineering departments of large battleships and cruisers, and engineer-lieutenants are sent to ships of all classes, including torpedo destroyers and submarines. In addition to the above the commissioned engineers stand by ships being constructed, and carry out the important duty of inspecting, testing and passing work produced in the various shipbuilding yards.

The pay of engineer officers is as follows:—Engineer rear admirals receive £3 per day, and engineer captains £1 15s. 0d. to £2, engineer commanders £1 4s. 0d. to £1 13s. 0d., and engineer lieutenants 10/- to £1. Ranking after the engineer lieutenants are the commissioned warrant engineers and the warrant engineers, and they may be called the practical engineers of the Navy, numbering about 670 and all promoted from the ranks of the engine-room artificer class. The duties of the warrant engineers are multifarious, and of late years, owing to the dearth of engineer-lieutenants, they have been placed in positions of much more responsibility than hitherto, and in a very large number of cases have taken the place of engineer lieutenants. To understand the duties of warrant engineers it is first necessary to study the number of officers carried on a battleship. During the manœuvres of last year one ship carried one engineer commander, one engineer lieutenant, and five warrant engineers, the work being allotted by the engineer lieutenant between the warrant officers, one having the main engines, one the boilers, one the engine room and stokehold auxiliaries, another having the double bottoms, flooding arrangements and steam boats, and the other together with the engineer lieutenant, exercising a general control over the whole department. By that means each officer specializes in one of these branches, and when the ship is not steaming he superintends all repairs in that particular department. When under way the watches are kept by one of the warrant engineers or the engineer lieutenants (if more than one is carried), and he is responsible for everything which goes on in the whole engine-room department. Four watches are generally kept, that is four hours on and twelve off. In addition to watch-keeping he must take what is known as day duty, that is, every fourth day his name is put up as engineer officer of the day, and he is responsible for everything which goes on in the whole department; he will take morning divisions, evening quarters, and go the rounds, also see the hands turned to at 6 a.m., and the engine-room artificers started on repair work at 7-30 a.m. In going the rounds it is usual to take an engine room artificer, a stoker petty officer, and two stokers. Every department is visited and the following particulars taken:—water in main and reserve feed tanks, steam pressure, density, alkalinity, depth of water in bilges, temperature of cold room, and any other special particulars, these being reported to the engineer commander and "all correct" given to the

upper deck officer going the rounds. The engineer officer must be prepared to be called upon at any time of the night in case of breakdown of any of the innumerable auxiliaries. Another important duty of the engineer officer is coaling, and the time taken may be from ten to twenty hours: he must direct the stowing of the coal, and owing to the great amount of trimming, due to the number of bunkers, a stoppage may occur at any time. Other duties include kit inspection, inspection of mess places, bath-rooms and hammocks. It is also necessary to become acquainted with the stations of men, during fire quarters, collision quarters, man and arm ship, and general quarters, any of which may be called day or night.

Referring now to the engine-room artificer class. The age of entry is from twenty-one to twenty-eight, the minimum height 5 ft. 4 in., and engine fitters, coppersmiths, boilermakers and engine smiths are enrolled. It is first necessary to pass a medical examination, after which proof must be given of having served at least five years at his trade; should he satisfy the authorities, he is sent to one of the three naval ports, and examined in theory and practice. The theory consists of reading, writing and arithmetic, simple and compound, also knowledge of engines and boilers; he must understand and be acquainted with the names and uses of all engine parts, understand the uses of steam, water and vacuum gauges, boiler mountings, how to take the density, alkalinity and height of water in the boiler, also how to deal with hot bearings and general breakdowns. The trade examination consists of fitting and turning, a favourite job being a butt-end strap for brasses with jib and cottar, and a piece of screw cutting. At the present time there appears to be a shortage of engine-room artificers, owing chiefly to the discontent and dissatisfaction caused by the introduction of the stoker mechanician scheme. The term of service is for twelve years and the pay is, under three years' service 38/6 per week, after three, 40/3, after seven, 42/6, after twelve, 45/6, with 1d. per day for good conduct stripes which are given, but not worn. After an engine room artificer has served six years he is eligible to sit for the rank of chief engine-room artificer. This examination is very similar to the second-class Board of Trade certificate and carries with it, if under six years' service pay of 49/- per week and if over, 52/6. An engine-room artificer can earn a pension of £1 6s. 0d. per week after twenty-two years' service. All engine-room artificers rank immediately on joining as chief petty officers and enjoy the privileges of that rank. It might be mentioned that any engineer holding a first or second-class Board of Trade certificate, and who is below the age of twenty-eight, can enter without examination, provided he passes the medical examination. In addition to these methods of joining the Navy, there is another, *viz*, by joining as a boy artificer. Each year a limited number of vacancies is advertised, open to the sons of British subjects between the ages of fifteen and sixteen. There are three systems of entry. (1) By open competition. (2) By recommendation of naval commanders-in-chief and certain other officials, on account of service claims. (3) By competition limited to candidates recommended by certain educational authorities. The open competition first mentioned is held in April each year and is conducted by the Civil Service Commissioners in the same manner as for dockyard apprentices. All applications must be made to the Secretary, Civil Service Commission, and the examination fee is 2/6; the subjects taken are arithmetic for which 250 marks are given, mathematics 300, English 300, history and geography 250, science 300, total 1,400. The second method of entry is limited to candidates with service claims. These entrants do not exceed twenty in number. They are sons of warrant officers and chief and first-class petty officers and the examination is similar to that in the open competition. The third method is limited to candidates recommended by educational authorities; the candidates must have attended a secondary or higher grade school for at least twelve months. The examination takes place in October and lasts one day, the subjects being practical mathematics and elementary science.

On successfully passing the examination the boy artificer receives a free outfit and is sent to one of the special training ships. There he is educated and instructed in general engineering work for three months, at the end of which, one of three branches of practical engineering is chosen for him, these being fitting and turning, boiler-making and smithing and coppersmithing and moulding; he then specializes in that branch of the trade. During the first year he receives 6d. per day, second year 7d. per day, third year 8d. per day, fourth year 9d. per day; on completing the fourth year he can qualify as fifth class and receive 3/- per day, after which he can pass for fourth class, and then be in every respect the same as an ordinary engine-room artificer. All leave granted to engine-room artificers is on full pay; only half the ordinary railway fares must be paid if an artificer wishes to proceed home.

Messing.—The commissioned officers mess in the ward room at a cost of about 1/6 per day; the commissioned warrant and warrant engineers mess with all other warrant officers in the gun room, or in a special warrant officers' mess, the cost of messing being from 9d. to 1/- per day. The engine-room artificers have a separate mess place on the lower deck, and mess entirely by themselves, this being one of the privileges of the rank, their mess account being about 15/- per month. The above sums are in addition to the service allowance of 8½d. per day. For the purpose of preparing and serving meals a certain number of stewards, cooks and domestics are allotted in proportion to the number in the mess, the engine-room artificers having stokers told off for a similar purpose.

Sleeping Accommodation.—Officers are allowed a cabin in order of seniority, the senior engineer-lieutenant generally takes one which is close to the engine room. In very few ships, however, are there enough cabins for all. The accommodation for the warrant engineers is often the same as for engine-room artificers, and consists of two hooks, by means of which a hammock can be suspended. In this respect the comforts of the engine-room staff compare very unfavourably with that of the engineers of the merchant service, and the life is thus made less attractive than it otherwise would be. The engine-room artificer employs a stoker (of whom there are plenty willing to do the work) to hang up and take down his hammock, for which, and also for washing it, 5/- per month is paid.

Perhaps a more detailed account of the duties of the engineers will be interesting. It is unnecessary

to say that on joining a ship it is first desirable to get a general idea of the run of the vessel, and this is not so simple as it might seem, owing to the many different compartments and watertight doors. On the day of joining it is necessary to report to the captain or commander and then to the engineer-commander, and as soon as possible obtain sketches of the general run of steam pipes, main and auxiliary, boiler valves, sectional valves, bulkhead and other valves of equal importance, and the lead of the suction and discharge pipes of the various pumps. It is also necessary to know exactly the function of each pump, and for what purpose it may be used. The same applies to voice tubes, engine-room telegraphs, watertight doors, flooding arrangements, ventilation trunks, steering gear, etc., and it is only by obtaining a thorough knowledge of all these particulars that a feeling of confidence and authority can be obtained. It is always better to trace and find out things for oneself than to rely on information obtained from subordinates.

(To be concluded.)

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondents.)

Portsmouth Dockyard.

THE past year has been an eventful one for the premier British naval arsenal, and has been marked by steady progress all round. From a shipbuilding point of view, perhaps the most striking feature was the launch of the *Queen Elizabeth*, the first battleship to be entirely dependent upon oil fuel. The opening of the new lock has greatly increased the docking and repairing facilities of the yard, and though in regard to labour the year has not been without its troubles, the increases in pay and the extension of the established list have gone far to promote good feeling. We have, therefore, very little to regret in reviewing the record of 1913, and look forward hopefully to a year equally, if not more, successful in 1914. The first event of importance in the New Year will be the laying down of our new battleship of the 1913-14 programme, the *Royal Sovereign*. This event has been fixed for Thursday, January 15th. This is about three months later in the financial year than the *Queen Elizabeth*, of the previous year's programme, was laid down, but there were special circumstances in regard both to design and construction which accounted for her earlier beginning. The *Iron Duke*, *King George V.* and *Neptune* were all laid down, like the *Royal Sovereign*, in the middle of January. It is persistently rumoured that the "Royal Sovereign" class are to be smaller in size than the "Queen Elizabeths," but the only real foundation for the assumption appears to be the admission of the First Lord in July last that they were to be coal-burning ships of less speed than the latter. Every new battleship laid down here has embodied an increase in tonnage over her predecessor, whatever the changes in design, and it seems most likely that the same thing may come to pass in regard to the new vessel. The *Iron Duke* returned from her gun trials on December 4th and reported that they had been successfully carried out. Her ten 13·5 in. weapons were fired singly, in pairs and collectively during the trials, and the anti-torpedo armament was also tested. The latter is the first to be composed of 6-in. instead of 4-in. guns. The *Iron Duke* is now being fitted out for commission early in the New Year, when it is said she will relieve the *Neptune* as flagship of the Commander-in-Chief of the Home Fleets. The battle-cruiser *Invincible*, having been ordered home from the Mediterranean, arrived on December 14th. Some doubt surrounds the exact nature of the refit she is to undergo after being paid off on the 31st, as while it is asserted on the one hand that the electric gear is to be removed from her turrets and hydraulic power substituted, on the other it is claimed that the electric machinery, after the long series of difficulties connected with it, has been working more satisfactorily of late. In any case, this "all-electric" ship has not been a complete success, and it is not surprising that the experiment of electrically operated gun-mountings has not been tried in other ships for the present. A desire to economise the consumption of oil fuel during the winter months appears to have led to the programme of exercises of the destroyer flotillas being somewhat curtailed. A large extension of the accommodation for oil fuel at Forton is now in progress, and in a comparatively short time the seventeen tanks now in use, each of which has a capacity of 5,600 tons, will be doubled, while in the not distant future the erection of no less than twenty-one more tanks is contemplated. Although coal will continue to be the main source of motive power in the Navy for some time, as far as big ships are concerned, it must be remembered that every new vessel built for several years now has been fitted to burn oil as an auxiliary, if not as the principal fuel.

Devonport Dockyard.

The closing month of the year was marked by many notable arrivals at this dockyard. Most important and interesting was that of the battle-cruiser *New Zealand* on December 8th, after her ten months' tour round the world, during which she had steamed 45,320 miles, dropped anchor in fifty harbours, and been visited by 578,937 people. A hearty welcome was given to Captain Lionel Halsey and his officers and men as their fine vessel came up into the Hamoaze. On December 1st, the *Flora* arrived from China to be paid off into the Material Reserve, and on the 17th the *Monmouth* arrived from the same station to prepare for further service in the Fourth Cruiser Squadron, the ships of which are now witnessing some novel and exciting scenes off the coast of Mexico. Another interesting arrival in the port on December 17th was the *Cambrian*, from Australia, the last cruiser to fly the flag of a Commander-in-Chief of the Imperial Navy on that station. When Sir George King-Hall struck his flag in her on Trafalgar Day last, the responsibility for the defence of Australian waters passed to the new Royal Australian Navy. The *Cambrian*, like the *Flora*, is being paid off into the Material Reserve. The launch of the *Warspite* was a great success. Fully 30,000 people saw the spectacle from the dockyard, and large numbers were afloat. Mrs. Austen Chamberlain, who christened the vessel, was accompanied by her husband, and the First Lord of the Admiralty was also present in the Admiralty yacht, in which Mr. and Mrs. Chamberlain returned to Portsmouth. The launching weight of the *Warspite* was 12,000 tons, and it was not for some four minutes after the cord holding the weights suspended above the dogshores had been severed that the huge mass was seen to be moving down the ways. A few days after the launch, Vice-Admiral R. H. S. Stokes relinquished the appointment of Admiral-Superintendent of the yard, which he had filled with ability and success since October, 1910. He and Mrs. Stokes were both very popular and they had a hearty send-off on leaving Devonport on December 11th, the Commander-in-Chief and a number of other officers and officials being at the railway station to wish them farewell. Rear-Admiral Godfrey H. B. Mundy, the new Admiral-Superintendent, was introduced to the heads of the various departments by his predecessor, and almost his first official duty was the presentation of prizes at the Dockyard Schools on the 16th, when he delivered an inspiring address to those present. The report that marine *C* 14 had gone down off Devil's Point created no small anxiety, and there was considerable relief when news was received that her crew were safe. The boat was entering the Hamoaze with four others of the Devonport Flotilla, which had been exercising off Torbay for a week, when she was run into by the Government hopper *D.H.* 27, which inflicted such a blow on her port side aft that the boat only kept afloat for a quarter of an hour afterwards. It was fortunate that boats were available in the vicinity, for the crew had only time to get clear before the submarine went down by the stern. Yard craft No. 94, which was specially built for salvage work, has been brought round from Sheerness to assist in raising her. The appointment of Chief Boatswain Richard Bowden as Assistant Coaling Officer has been extended for one year from April 1st next.

Chatham Dockyard.

The old year passed away very quietly as far as Chatham Dockyard was concerned. No clouds threatening on the

international horizon, there were an unusually large number of ships in the Medway giving Christmas leave, but apart from the coming and going of the officers and men belonging to them there was very little doing. An indication that there was no stress of work in the yard itself was afforded by the Admiralty order that no overtime was to be worked if it could be avoided. Like most orders of a similar kind, this has been received with mixed feelings. Possibly it is but the prelude to an extra busy time next year; at any rate, it may be hoped so. There are two light cruisers, the *Calliope* and *Conquest*, to be begun in 1914, besides smaller craft and submarines. At present, we have the *Lowestoft* and *Arethusa*, with four submarines, in hand, the first-named being nearly ready for commissioning. We do not anticipate any reduction of repair work, which forms so large a part of our activities. The *Leviathan* and *Sapphire* are the two ships now undergoing long refits, and doubtless two more vessels will be set down to be taken in hand under the new Estimates. The *Vanguard*, as mentioned last month, has been placed in the floating dock, which is still here, although it was nominated for transfer to Cromarty some months ago. Partly owing to its situation, it has not been an all-round success, but has undoubtedly contributed to the usefulness of the eastern yard from a docking point of view. The cruiser *Sirius* arrived from the West Atlantic after a rough passage, during which her captain had a private 18-knot motor boat destroyed, and on December 7th was paid off here. She is to be prepared for commissioning on January 27th as a trooping ship, her first voyage being to the East Indies with new crews for the *Alecto* and *Odin*. The *Proserpine*, on being withdrawn from the Mediterranean, is also to be paid off here in the first week of the New Year for service in the Third Fleet at the Nore. By the time these lines appear, the retirement will have taken place of Engineer-Rear-Admiral William Sharp, the senior officer of his rank in the Navy. He has been since July, 1911, on the Staff of the Commander-in-Chief at the Nore, in which post he has earned the goodwill of all who have come into touch with him at Chatham and Sheerness. He entered the Navy as an engineer student at Keyham over forty years ago, and has risen by merit to one of the highest positions open to the engineering branch of the Navy, that of senior engineer officer on the staff of a Port Admiral. He is being succeeded by Engineer-Rear-Admiral W. F. Pamphlett, from the staff of the Vice-Admiral Commanding the Second and Third Fleets. The news that the Admiralty had rewarded the gallant dockyardmen who went to the rescue of the men overcome by fumes while applying black varnish inside the ballast tank of submarine *E 7* last September was received with general gratification. The names of these plucky rescuers deserve to be placed on record. They are: P. H. E. Williams, T. J. Shears and V. Blundell, engine fitters; C. S. Dengate, C. B. Wilson, G. Pritchard and S. Clow, skilled labourers; F. Smith, riveter and H. W. Cate, iron caulker. The Admiralty granted them £2 each "as a slight recognition of their usefulness and consideration for their fellow-workmen."

Sheerness Dockyard.

In view of the reports concerning a shortage of oil fuel for all possible requirements of the Fleet, the arrival at Port Victoria on December 14th of the oil tank steamer *San Fraterno* attracted more than ordinary attention. There seems hardly a doubt that the authorities have been a bit stringent regarding the amount of oil used, especially in the destroyers, but whether from choice or necessity it is difficult to say. With ever increasing prices, it is not surprising that the vessels' movements should be arranged so that they might be less liberal in the consumption of oil than would otherwise be the case. The cruiser *Hermes* has not had a very long career as head-quarters of the Naval Wing of the Royal Flying Corps. Early in December, she was ordered to be paid off, and the head quarters are now at Sheerness sub-depot. The barracks here have thus come to be used for yet another purpose. They were the home at one time of the gunnery school for the Medway, but that was transferred to Chatham some six years ago, since when the buildings have been utilised for the branch War College, and for the accommodation of officers and men sent to the rifle range at Barton's Point. On more than one occasion it has been said that the torpedo school in the Medway would be transferred to them, but nothing has come of the proposal. The torpedo school is at present conducted in the old frigate *Actaeon*, formerly the *Ariadne*, in which, by the way, a serious fire occurred in the early hours of Sunday, December 7th. The fore part was considerably damaged, and but for the prompt action of the dockyard authorities the whole of the ship might have been destroyed. From the time the alarm was raised, only seven minutes elapsed before a tug was leaving the Cornwallis jetty to render help. The *Actaeon* has been temporarily repaired, but it would not be surprising if she were paid off before long and the torpedo school transferred to more suitable quarters.

Pembroke Dockyard.

The launch of the new light cruiser *Cordelia* has been fixed, it is said, for January 21st. She will therefore be the first of the second group of "light armoured cruisers" to be put afloat. Having been laid down on July 21st, 1913, the *Cordelia* will be in the water in exactly six months from the laying of her keel, which will be highly creditable to all engaged in her construction, when the conditions of construction and all other circumstances are taken into account. It may be hoped that the authorities of the yard will be able to keep to the date mentioned, especially as a second vessel of the type, the *Carysfort*, is due to be laid down here before the conclusion of the financial year on March 31st. As we have also the *Nottingham* fitting out, and the oil carrier *Trefoil* completing afloat, with the oil carrier *Turmoil* building on the stocks, it will be seen that the end of 1913 found the yard busily occupied as far as new construction is concerned. Of refitting work, too, there was no lack, a couple of destroyers being in hand for retubing and general overhaul, as well as the *Heliopolis*, which is being converted into a hospital ship to be called the *Mediator*. The *Nottingham* is making steady progress, and it should not be very far in the New Year before she is ready for commissioning. She was undocked at the end of November, and on December 15th was moved to the inner berth at the Carr Jetty to receive her gun shields. The *Jupiter* left for Devonport on December 2nd to be docked for examination, and the *Venus* has not yet arrived, so that the Eighth Battle Squadron in Milford Haven at present includes the *Goliath*, *Ocean*, *Canopus*, *Albion* and *Terrible*. The *Kale*, destroyer, arrived in the middle of December for her retubing refit.

ENGINEERING DEPARTMENT OF THE ROYAL NAVY.—The artificer engineers and engine-room artificers have submitted suggestions to the Admiralty that their conditions of service may be improved. These refer to pay, accommodation, pension, promotion, re erve, and the elevation of tho stoker to the duties of the engineer. The artificer department has never been regarded as particularly congenial to the engineer, and, apart from this, if the conditions be disadvantageous, doubtless the recruiting has been influenced, and if greatly inferior to those in the mercantile marine, a short experience may have led some to the merchant service. The statement that "in the mercantile marine the pay is better, ranging from £10 to £34 per month" is hardly correct, as from £7 is quite a fair estimate, and the number of chief engineers at £34 is certainly less than the 10 per cent. who are promoted from artificers to artificer engineers; while the question of pensions awarded is quite in favour of the Government service, and will rise with increase in pay. The accommodation for artificers is stated to rank on a par with that of the mercantile firemen; suggestions for improvement are commendable and must be regarded. Promotion may be accelerated in time of war. The elevation of stokers is a matter which requires considerable knowledge of the conditions and statistics of how far the efficiency of the department is affected by the introduction of the shovel engineer; at the same time this subject has previously been referred to as a most undesirable element.

SAFETY OF LIFE AT SEA.—Mr. Charles Buchanan, assistant to the chief ship surveyor, Lloyd's Register of Shipping, has been appointed to fill the vacancy on the Committee on Bulkheads and Water-tight Compartments in Ships, and Mr. George R. Mares, a principal surveyor on the chief ship surveyor's staff of Lloyd's Register, to fill the vacancy on the Committee on Loadline. These vacancies have been caused by the death of Dr. S. J. P. Thearle.

MARINE ENGINEERS' B.O.T. CERTIFICATES.

We have received further communications, as published below, on the new Board of Trade regulations. Owing to the great pressure on our space we are reluctantly compelled to hold other letters over until next issue.

To the Editor, MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—I feel it my duty to express my appreciation of your efforts on behalf of certificated Marine Engineers, as expressed in your leading article, in which you deal with a very vital question, *viz*:—the proposed alterations to the regulations under which they obtain their certificates, and also opening your columns to a controversy on the subject which has roused me, for one, to my responsibilities to the profession and the public safety. I shall be pleased if you will give publication to my views should you consider them of sufficient interest. Let me state, I have had a Technical College training, served the usual engineering apprenticeship, including Drawing Office, and have held positions from junior to Chief Engineer of both cargo and passenger steamers, and considered it well worth while to obtain the highest qualification granted by the Board of Trade, *viz.*: Extra Chief Engineer—therefore I think you will agree that at least my experience justifies me expressing an opinion.

Firstly.—I think a technical training during the apprenticeship should be encouraged by all, but the extent to which it interferes with practical workshop experience must be limited and carefully considered.

Secondly.—A third engineer's certificate, granted before a young man goes to sea, would certainly encourage the apprentice to conscientiously attend classes; this would tend to check the lazy and useless junior from entering the service, where he is nothing but a source of danger and annoyance to his superiors.

Thirdly.—To my mind the increasing of the sea service time is a step in the right direction, as the experience gained there cannot be obtained from either Technical Schools or workshops. It cultivates a valuable knowledge of the upkeep, maintenance and efficient running of machinery and boilers, self-reliance, resourcefulness and the command of men; these qualifications outweigh any which can be obtained on shore.

Lastly.—It is the duty of the Board of Trade in the interest of the marine engineer, commerce and public safety, to watch carefully that they do not by their regulations depreciate in the slightest degree in the eyes of the young man, the absolute importance of the sea training.

I therefore must add my protest to those of others which have appeared in your columns against the Board of Trade placing, as one of your correspondents aptly put it, "the sea service in the balance in part or whole with Technical School attendance in any form whatsoever." Such a sacrifice is out of all proportion and as I must again repeat, antagonistic to the general efficiency and safety at sea, of which we are now hearing so much.

Asst. Supt. Engineer.

Dec. 4th, 1913.

To the Editor of the MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—May I ask permission to add a few remarks in your valuable columns to those which have already appeared respecting the new Board of Trade regulations for the examination of sea-going engineers. The subject is not treated in a startlingly original fashion; the writer merely wishes to record a humble opinion proceeding from a somewhat different direction.

It did not need the appalling *Titanic* disaster and its immortal and ever-glorious example of heroic devotion shown by the engineers and their assistants to make the sympathetic feeling of admiration which proceeds towards the mercantile engineers from their "opposite numbers" in H.M. service. It had existed before and was merely strengthened thereby. It is this feeling, together with the full appreciation of the subject under discussion, which induces another practical sea-going engineer to add his quota to the debate.

The vital issue in the matter, of course, is the substitution of a certain amount of school time for actual sea-going experience. Now, practical experience has to be bought. By some dearly. To others, more fortunate, at less cost; but the price is always high, and this amount cannot be lessened, nor is it negotiable. You cannot exchange this dearly-bought commodity for all the theoretical training there is; for it is practice, and practice alone, which gives a clear head, the alert mind and the responsive touch in times of emergency or of acute stress. Show me the man who has dealt successfully with a "burnt finger" bearing a half empty steaming boiler, or a fractious vacuum by text-book knowledge alone, and this protest shall sink into the oblivion which, in the opinion of some, it may already merit. Schooling in addition to practice is unassailable. To substitute theory for experience, to my idea, is like sending a novice to open a self-closing stop-valve. He may open it—or it may open itself. In the latter case about the only satisfaction he gets is that the inside is exactly like the sketches he has seen of it—sketches he will never see again.

In H.M. Navy, where the opportunities of acquiring theoretical knowledge are undoubtedly much greater than in the case of the Merchant Service, a large and ample watch-keeping experience is necessary for promotion and rigidly adhered to in all cases.

It would hardly seem conceivable, however, that a powerful Board of Trade could, on consideration, blind itself to the deteriorative nature of its proposals; to the serious and lasting bad effect it must have, not only upon the practical efficiency, but upon the morale of the sea-going engineer, or to the menace it affords, in principle, to the safety of the public who travel upon the high seas. It is for this reason therefore, that the writer—as an outsider maybe, but still interested and fairly intelligent—urges the necessity of strong and earnest representations on the part of those more influential members of the profession concerned, representations which must only have one object and, we trust, one result, *viz.*, the revisal of the regulations affecting so intimately the welfare of thousands who, from considerations of space and time, and mayhap, opportunity, are debarred from helping or defending themselves.—I am, sir, yours faithfully,

ENGINEER-LIEUTENANT, ROYAL NAVY
(Retired).

To the Editor of MARINE ENGINEER AND NAVAL ARCHITECT

Sir,—The articles which have appeared in your representative journal on the subject of the marine engineer, his duties, his responsibilities and his aspirations have been the means of calling attention to very important questions, and I beg to be allowed to add a few comments.

In regard to the proposed new regulations of the Board of Trade, these are as a rule only seen by those engineers who may study them with a view to go up for examination, hence your article directed attention to what might otherwise have passed unseen till too late for discussion and consideration by those most deeply concerned.

I agree with the writers of former letters which you have published, practical service both ashore and afloat must be given the first consideration, and no efforts of education authorities, whatever their object, should be allowed to sway the Board of Trade in reducing the practical value of the certificates granted on examination to practical men. If any allowances are to be given, some consideration is due to the junior engineer who may serve for eight months or more in a capacity which, under the present rules, does not qualify for second-class certificate, although he may be giving every satisfaction in the duties assigned to him.

It seems to the writer that the omission of the practical work service of the junior engineer from the regulations, and the substitution of the attendance at certain schools, which are thus granted a monopoly, for a period of 4½ months or days, as the case may be, inflicts a hardship on the junior whose case is instanced and who may be devoting himself to a course of private study while at sea.

With regard to the R.N.R., steps should have been taken long ago in connection with this matter on the lines suggested by the articles published by you from time to time, and certainly a representative society should be looked to for vigorous action on so vital a point as the status of the marine engineer and his value to the defence of the Empire. Possibly negotiations have been in progress during the year and we may shortly look for a satisfactory result already too long delayed.—Yours,

"STILL WAITING."

London, Dec. 12th, 1913.

Sir,—I have read with much interest your article and the succeeding correspondence with reference to the new Board of Trade regulations—the articles of faith of the marine engineer—and while fully recognising the broad-minded views therein expressed I would have been more deeply impressed by a somewhat more open-minded view of the situation. Your correspondents, and also the writer of some similar articles which appeared in a contemporary, are, I surmise, marine engineers who have dropped anchor in some port or other for good, and will naturally tend to look at the matter through their own particular pair of glasses as opposed to the outlook of the Board of Trade, which I apprehend is principally the maintenance of the engineer efficiency in the mercantile marine.

Those who having kept all the commandments have entered within the pale, are, of course, disposed to resent any depreciation of the regulations for admission; the education authorities are also no worse than the sundry sharks and touts that infest incoming ships, knowing that a big pay-off is due; the schools and coaches not included in the list of monopolists have visions of their business receding to the low-water mark; while the oncoming apprentice and junior, who bear the real brunt of the matter, are seen and not heard, like the student in the technical education problem or the mummy in the glass case.

It is sometimes difficult when reading short letters such as you have published, to determine exactly what are simply statements of fact, statements of fiction, passing comments, quiet criticisms, hard words, storms of abuse or explosions of anger, but there would appear to be some opposition of sorts to the action of the Board of Trade who, while penalizing those obtaining the certificate under the new regulations, are putting inducements in the way of young engineers to acquire a more scientific training—a matter which is in any case left optional and has none of the pernicious compulsory element.

I do not think so great a change will be effected as is expected, and so long as the regulations give sufficient latitude, no great hardship will ensue. The regulations have never been administered in a hard and fast manner likely to lead to injustice, and a study of the Board of Trade statistics would probably reveal the fact that the average time served at sea, both for first and second-class certificates, is nearer eighteen than twelve months. A similar study of the enrolment lists, particularly of the evening classes, compared with the attendance roll and pass lists will doubtless supply one of the reasons for offering substantial inducements to students to attend the classes in some of the educational establishments.

It would be interesting to know quite what was required to have a school approved by the Board of Trade, if the teachers were required to have a degree obtainable in eighteen months or an extra first obtainable in seven years. If the possession of a laboratory is the dominant feature, how much laboratory work will be done in 4½ months, starting with thermometers and metre sticks. Eh?

In any case your article may serve a useful purpose in increasing the circulation of the regulations, a study of which, together with the appendices, ship's articles and the Shipping Act would be of much service to some engineers—and those compelled to sail with them.—Yours faithfully,

REGULATED.

London, Dec. 13th, 1913.

The illustration shows the result due to the bursting of a cylinder which contained CO^2. It is reproduced to indicate the necessity of giving every attention to the condition of such cylinders, and the conditions under which they are used. The cylinder in question was taken from the tunnel and placed in the engine room with a view to use the CO^2. It was left there for a time ready for service, the higher temperature, probably, to which it was exposed led to the expansion of the CO^2 with consequent increase of pressure, which the weakest place in the cylinder could not stand. Fortunately no one was injured.

THE HANNA STEAMSHIP CO., of Cleveland, Ohio, have contracted with the American Shipbuilding Co., of Cleveland, and the Great Lakes Engineering Works of Detroit, respectively for a vessel each to be constructed on the Isherwood system, both vessels to be duplicates of the *Quindy A. Shaw*, built by the first-mentioned Company.

STERN SONNEBORN OIL CO., LTD., will have a large number of their specialities on view at the forthcoming North of England Motor Show at Manchester (Stand No. 108). Among their exhibits will be a lubricating substance called "Ambroleum," for gear boxes, described in our December issue. A gear box will be exhibited, running at a speed of 500 r.p.m., showing the action of Ambroleum under actual working conditions.

MESSRS. JAMES HOWDEN & CO., LTD., Scotland Street, Glasgow—the death of whose principal, Mr. James Howden, engineering circles everywhere have so lately had to deplore—have experienced a year of most strenuous work in all departments of their business. The installations of the Howden forced draught system are now roughly measured by the fact that an aggregate of fully 14,000,000 h.p. have been fitted. The demand for their manufacture of high-speed engines of the forced lubrication type, specially designed for the generation of electricity, has been increasingly felt, and large numbers, in single units up to 2,000 h.p., have been supplied for installation at home and abroad, the principal clients being, in addition to ship-owning concerns, municipalities, colliery, factory and mill-owners. In another branch of their business, that of the manufacture of the Howden-Zoelly impulse steam turbines, great activity has prevailed, and at the present time the firm are completing the fourth turbine order for the Corporation of Manchester, the capacity of the unit being 30,000 h.p. The latest development of the Howden's Company is the building in Helen Street, Govan, of new works as a branch establishment for the manufacture of a special patented type of combination sectional water-tube boiler, designed to embody the benefits of the cylindrical boiler with the good points of the water-tube boiler, but without any of the disadvantages of the latter. These boilers have also been designed to permit of the Howden system of hot air forced draught being employed in a convenient form. Already evidence is abundant that the boiler will be largely adopted both for marine and land installation, many contracts having been obtained from leading corporations and steamship owners. The boilers that have already been completed and worked have proved eminently satisfactory.

The Story of The Orient Line.

THIS steamship company differs from those which we have so far noticed in the fact that it came into being with a few chartered steamships, its managers in the early days not having apparently contemplated the building of a special fleet. Herein they differed from such Companies as Cunard's and the Royal Mail, who had many suitable steamships completed or on order ere they arranged to despatch a vessel on their intended routes. It was about the year 1877 that the two London firms of Messrs. Anderson, Anderson & Co. and Messrs. F. Green & Co., already well known in the Australian trade, made up their minds to unite their efforts and to start a new line between England and the Australian Colonies. At that time the Australian mails were sent by three distinct routes. The most important was that *via* the Suez Canal, with transhipment at Ceylon, whilst there were supplementary services by way of Singapore and San Francisco. The promoters of the line which became the Orient, were of opinion that there was an opening for a new service trading by the long sea route round the Cape of Good Hope. Their desire was, of course, to obtain Government assistance, for in those days there was nothing like the volume of passenger traffic which has now to be dealt with, and there were no refrigerated cargoes to help in the ships' freights. But all efforts at obtaining a mail contract proved fruitless. So, nothing daunted, the two firms determined to make their budget independent of any outside assistance. As we have seen in our note on the Pacific Steam Navigation Company, that concern achieved a great measure of prosperity in the early seventies, and with a view to more frequent services to South American ports built a considerable number of steamships of the very highest class. But almost before the first of these vessels could be delivered a reaction came, and it was realized that the intended developments could not, at all events at that time, take place. The Pacific Steam had thus a considerable amount of unoccupied tonnage of the first class, and the suggestion that Messrs. F. Green and Co. and Anderson, Anderson & Co. should acquire some of their large steamships came opportunely enough. An arrangement was made by which the following vessels were taken up. These were :—

Steamship.	*Tons gross.*	*Year built.*	*Builders.*	*Place of building.*
Lusitania	3,825	1871	Laird Bros. ..	Birkenhead
Chimborazo....	3,847	1871	John Elder & Co.	Glasgow
Cuzco	3,845	1871	John Elder & Co.	Glasgow
Garonne	3,876	1871	R. Napier & Sons.	Glasgow

Each of these vessels had compound engines of about 3,000 i.h.p., which put them in the first rank of ocean steamships as regards speed. As regards size, it will be remembered that the crack Atlantic vessels of that day were none much over 5,000 tons gross register. The announcement that one of these vessels would be despatched in June, 1877, was received with much interest, and, when the *Lusitania* left Plymouth on the 25th of that month, she carried no fewer than 300 passengers. Her voyage was a great success, she surpassed all expectation by accomplishing the trip in a record time of forty days, calling only at St. Vincent and passing Capetown without a stop. The success of this voyage gave the line an excellent start and paved the way to all subsequent developments.

Ere very long it was seen that the service might be made permanent, and so the Orient Steam Navigation Company was formed.

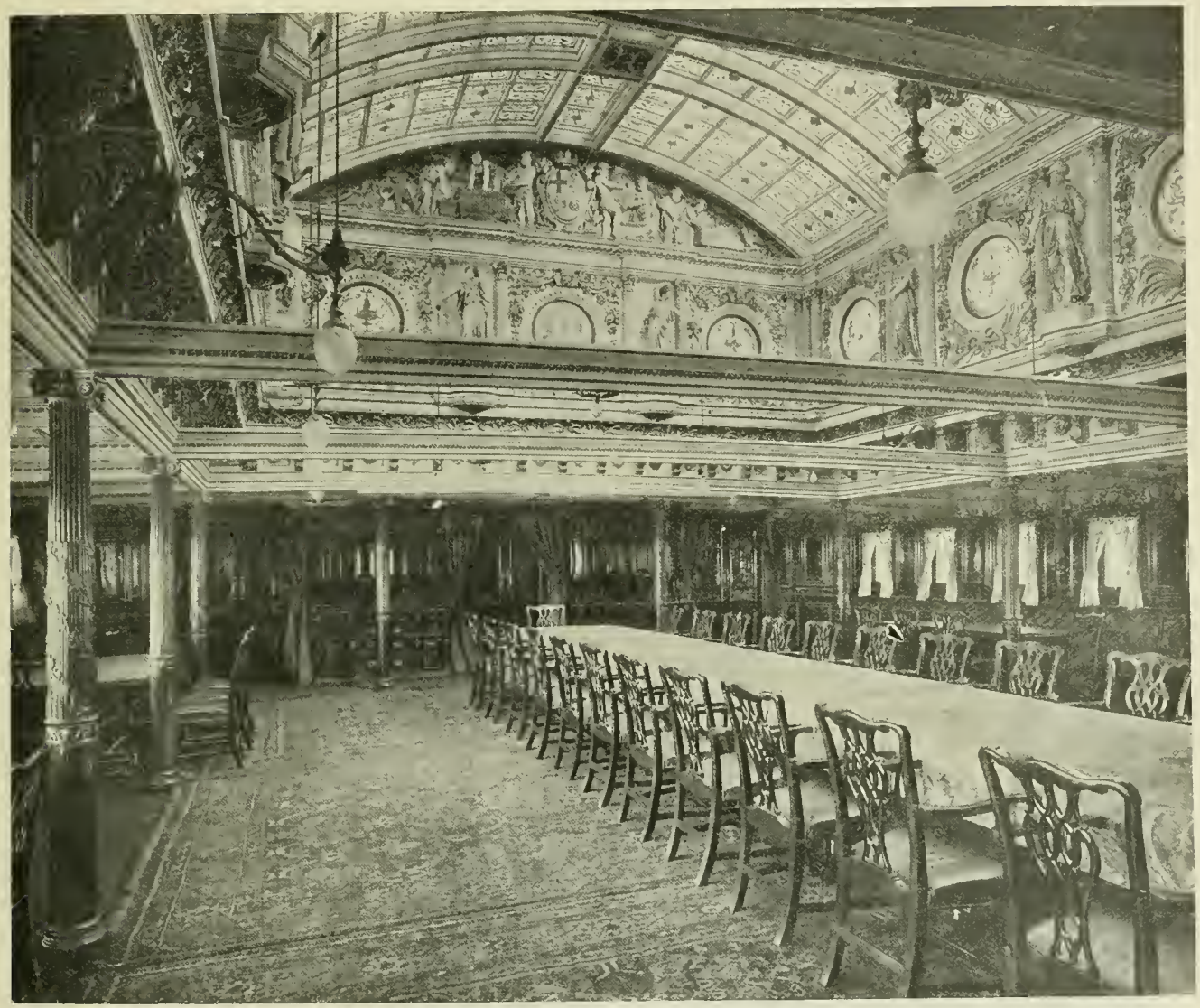
Orient Line s.s. *Cuzco*, 3,918 tons. One of the original fleet of the Orient Line in 1878.
Observe the clipper stem and the continuous spar deck with the absence of superstructure, characteristic of the period at which she came out.

Orient Line s.s. *Orient*, 5,365 tons. The first steamship specially designed and built for the Australian trade. She was at the time—1879—the largest vessel in the Mercantile Marine, excepting the *Great Eastern*, and beat all records by accomplishing the voyage to Adelaide in 38 days.

In 1879 a new steamship, specially built for the Company's trade, was launched on the Clyde by Messrs. John Elder & Co. This was the *Orient*, of no less than 5,386 tons gross register, a vessel which offered every luxury to be found at sea at that date for the intending passenger. The *Orient* soon made a name for herself as a favourite ship, and the good opinions formed of her by the travelling public were endorsed by Government officials after her service with the British Expedition to Egypt in 1882. In 1881 this vessel was followed by the *Austral*, also built at Fairfield. She was practically a sister to the *Orient*, save that, in the interval between the designing of the two ships, it had become possible to replace the iron in the fabric of the *Orient* by steel frames and plates in the *Austral*. The changes which have taken place in the thirty-two years which have passed since the coming out of the *Orient* may be noted from the fact that she was in 1879 the biggest merchant vessel—always excepting the old *Great Eastern*—which had ever entered the port of London, and that she beat all existing records by accomplishing the voyage to Adelaide in the space of thirty-eight days. The *Austral* was a remarkable vessel for the time at which she was built. Her builders contracted that her machinery should develop 5,800 h.p. on trial. But in point of fact her engines indicated 7,114 h.p. on the measured mile in April, 1882, and did the distance at a speed of 17·3 knots. Indeed on her voyage round to London from the Clyde she averaged no less than 16·1 knots and performed the run from the Cloch to Margate Buoy in 42 hours and 10 minutes, although the tide was generally against her. In 1884 she was employed on a fortnightly service on the Atlantic between Liverpool and New York in conjunction with that famous liner the *City of Rome*. The *Austral* averaged 16·1 knots at sea during her Atlantic season. On her last eastward voyage in this employment she returned to the English Channel and accomplished the record for any steamship between New York and Plymouth. She then returned to the Australian service, where she remained for many years, till superseded by larger and more modern vessels.

Hitherto the sailings had been monthly, but in 1880 the demand was sufficient to justify the managers in despatching a steamship every fortnight. This alteration in their sailings called, of course, for a largely increased fleet, and, now that success seemed assured, the management had no difficulty in inducing the Pacific Steam Navigation Company—which had hitherto confined its interest in the adventure to the charter or sale of vessels—to become a co-adventurer and supply a certain amount of tonnage on its own account. The year 1880 was, however, memorable for another departure of supreme importance to those interested in the Australian trade, for it was in this year that the Orient Company first provided refrigerated space in one of their vessels, and it was from this beginning that there sprang the huge business in meat, perishable produce and fruit, which now exists between the Commonwealth and the Mother Country. By

S.S. *Otranto*. Cabin de Luxe.



Saloon of the *Ophir* as arranged for the Royal Cruise in 1901

This vessel was selected to take their present Majesties—then the Duke and Duchess of York—on their visit to Australia and other British possessions.

this time it should be noted, the Cape route had been deserted for that through the Suez Canal and Red Sea to Colombo, though indeed for a time when the trouble in Egypt was on and there seemed a possibility of interference with the waterway by Arabi Pasha and his followers, there was a return to the longer route where interruption is impossible.

The resumption of sailings *via* Suez enabled the Company to despatch its vessels in their fortnightly turn in those weeks in which there was no P. & O. mail sailing to Australia. The ports of call were not quite the same for the two lines, the Orient having already elected to visit Naples instead of Brindisi, and their ships being reported from Perim instead of making a regular call at Aden. But the Post Office soon found that the steamships of the new line afforded it an opportunity of giving the public a weekly, instead of as theretofore, fortnightly mail despatch to Australia *via* Suez. With that peculiar form of mentality which characterizes the working of all Government departments, however, it elected, in the case of the *Orient* mails, to use its statutory right to ship mails by any British steamship leaving a home port for an oversea destination at a given rate, whilst, of course, continuing to give the contract rates to the older Company. The absence of a regular mail subsidy was necessarily a serious matter to the managers of the Orient Line in those early days, for it found itself in competition for the passenger and high-class cargo business with ships belonging to lines which were all handsomely subsidized by our own and foreign Governments. It was obliged, for the sake of its business engagements and the requirements of its passenger traffic, to run to schedule as did they, and it thus offered equal facilities to the Post Office for a smaller compensation than that paid to its rivals. Nevertheless it kept on its progress, and in the year 1889 added three larger steamships to its fleet. One of these was the *Ormuz*, of 6,387 tons gross register, built, like the *Orient* and the *Austral*, by the Fairfield Company. In view of recent discussion it is interesting to note that her equipment comprised some ten boats under davits and a steam launch. About the same time two other vessels of size similar to hers were provided by the Pacific Steam Navigation Company for the same service. These were the *Oroya* and the *Orizaba*, built by the Barrow Shipbuilding Company. They had accommodation for somewhere about 700 passengers, of whom 124 were carried in the saloon 154 were second-class, and 412 were of the third-class. The saloons of these vessels were large enough to dine all the first-class passengers at once, and electric light was provided

throughout. The provision of vessels such as these—whose speed on trial exceeded 17 knots—was, no doubt, a factor in the next development in the history of the Company, which in the year 1888 received its share of the mail contract—a position which it has since retained, though, of course, under altered terms as the arrangements have been renewed. Then in 1891 the famous *Ophir* was added to the Orient side of the fleet. She was the first twin-screw in the Australian mail service, and displayed other features making for safety. These included a longitudinal bulkhead in her engine-room, two sets of boilers separated by the machinery compartment, ten transverse bulkheads and a double bottom extending two-thirds of her length—say 319 feet out of a total length of hull of 465 feet. Her maximum speed on the measured mile was 18 knots. Messrs. Robert Napier & Sons were her builders, and they bestowed particular attention on the question of safety, embodying in her design as far as possible the suggestions of the Bulkhead Committee which had then been recently sitting. Probably these facts had something to do with the honour which was bestowed on this vessel in 1901, when she was selected by the Admiralty to take their present Majesties—then T.R.H. the Duke and Duchess of York—on their important visit to Australia and other British possessions. Though at that time the vessel had been in regular use as a passenger steamship for ten years, she was prepared for her new vocation as a Royal yacht in some two months. The dining saloon remained unchanged in its scheme of decoration, but otherwise the first-class accommodation was almost entirely swept away, a large number of state-rooms on the upper deck being removed to allow of the substitution of the two Royal suites, and drawing-rooms, smoking-rooms and writing-rooms being provided for the Royalties, whilst adequate accommodaiton was also prepared for the various members of the suite and for the numerous servants who made up the retinue. For the time being the *Ophir* was a man-of-war and flew the White Ensign, her navigating officers and most of her crew being naval men, though the Orient Company supplied

Centre of Dining-room, s.s. *Orvieto*.

The *Ophir*. The Duchess's Sitting-room.

the engine-room staff and the stewards division, whilst it also held held itself responsible for the victualling of the ship. The two partners in the business had already in 1899 each provided a new twin-screw of about 8,000 tons and of 8,500 h.p., the Orient obtaining delivery of the *Omrah* from the Fairfield Company, and the Pacific Company providing the *Orteona*, which came from the Barrow yard, then already under the management of Messrs. Vickers, Son & Maxim. In 1902 a still larger vessel, the *Orontes*, of over 9,000 tons, came from the Fairfield yard for the Orient side. The next incident in the steady progress of the line was the withdrawal of the Pacific Company from the Australian trade. A new mail contract was called for by the Post Office in 1908, and the conditions then insisted upon were of a most stringent nature. They involved, amongst other things, the building by the contractors of a new fleet of 12,000 ton vessels. These conditions did not commend themselves to the Orient Company's colleagues and so the Orient Line accepted the new contract on its own responsibility, and ordered five steamships of the size demanded. These were the *Otway*, *Otranto*, *Osterley*, *Orvieto* and *Orsova*, all of which were launched in the following year. The particulars of these ships are as follows :—

a matter of great cost to the contractors. Yet the current contract with its higher speed is based on a payment of some £45,000 less than the sum payable to the Company when 12 knots was the stipulated speed for the Australian mails.

The Allan Line

is able to announce the sailing dates for its two new steamships *Alsatian* and *Calgarian*. The former, which it will be remembered was built by Messrs. Beardmore's, is to sail on her maiden trip on the 17th January, whilst her Fairfield sister is to follow on the last day of February. The *Alsatian*, which had a trial on the 16th December, will make an extended run from the Clyde to Land's End and back before delivery at Liverpool. The performances of these vessels are likely to effect new time records in the St. Lawrence trade, though their early voyages will, of course, be to Halifax, as the St. Lawrence will be closed for the first few months of their activity.

The Royal Mail Company

inaugurated its new service between Halifax and West Indian ports with the sailing, on the 6th December of its steamship *Cobequid* for the Carribbean Sea. The new contract replaces that which has been held for some years by the Canadian firm of Messrs. Pickford & Black, of Halifax, Nova Scotia. Though the steamers are larger than those hitherto in use on the station, the speed arranged for under the new contract is only a knot greater than that under the old. Accommodation for 190 passengers is to be provided in each of the contract steamers—forty being in the saloon, sixty in the intermediate and ninety in the third-class. The contract is for five years and the subsidy is to be at the rate of £70,000 a year. This sum is to be found entirely by Canada herself. Four steamers are to be employed in the line. They all four bear the names of Canadian bays. But it may be remarked that two of them have hitherto belonged to the Union Castle fleet—being of that Company's famous "G" class—whilst the other two were formerly engaged in the Royal Mail Company's own Shire line service.

The Ill Luck

which notoriously attends certain ships has once more been exemplified in the case of the fine Liverpool steamship *Indrabarah*, which was blown ashore on the coast of New Zealand early in May. The Court of Inquiry complimented those charged with her navigation on the way in which they had behaved under sufficiently trying circumstances, and the vessel was eventually floated after being a couple of months on the rocks. She is a steamer of some 7,600 tons gross register, and having twin-screw engines and a large refrigerating installation, her value was high. Large repairs were effected in a southern port and at last she sailed for home; but the journey was not to be completed without another accident, and so she must needs go ashore in the Suez Canal, resisting all attempts to float her till a large part of her cargo was discharged.

Fires.

The length of time which fires in modern steamers continue to smoulder was well exemplified in the cases of the *Volturno* and the *Templemore* on the North Atlantic. An even more prolonged conflagration is taking place aboard the oil tanker *Twigone* of the Burmah Oil Company, which took fire in Tuticorin Harbour in the first days of October. Unfortunately the flames spread so quickly that there was loss of life, the master, his child, and the first and second engineers being victims. The wreck was then towed to a point some four miles distant from the harbour and it was hoped that the machinery at least might be saved intact; but on the 18th November, more than six weeks after the outbreak, the vessel was still burning and that with sufficient vigour to result in an explosion. Even that did not put the fire under control, for it was still smouldering a full month later. The cargo on board at the time of the outbreak seems to have amounted to some two thousand tons, for as oil tankers go to-day the *Twigone* was a comparatively small ship. So, too, the *Scotsdyke*, which took fire in the English Channel on the 18th November and was towed into Southampton, took fire again in the North Sea on the 3rd December when off Harwich on her way round to Sunderland to be repaired. The recrudescence of the fire in this ship is the more remarkable from the fact that not only was she beached and flooded at Calshot Point, but she was actually docked at Southampton and to some extent overhauled before proceeding for Sunderland. Yet the fire does not seem by all this to have been effectually subdued.

The Japanese Mercantile Marine.

A Japanese official paper gives statistics of the numbers of purely cargo vessels under the Chrysanthemum flag. They are as follows :—

	Number.	Tons.
Under five years' service	15 ..	37,205
Over five and under ten years' service	9 ..	32,128
,, ten ,, fifteen ,,	26 ..	122,918
,, fifteen ,, twenty ,,	59 ..	269,960
,, twenty ,, twenty-five ,,	97 ..	354,656
,, twenty-five ,, thirty ,,	47 ..	219,168
,, thirty ,, thirty-five ,,	59 ..	152,810
,, thirty-five years' service	18 ..	32,239
Total	330 ..	1,241,084

These figures are interesting, not only from what they show of the size of the Japanese steam fleet, but also from the indication they give of the average size of the vessels built at certain periods. But of course we must not forget that many of these vessels were built in European yards and bought second-hand by their present owners. Thus we cannot pretend to learn from these figures of the periods at which the expansion of the Japanese shipping companies was at its highest tides, for the ships included in the table were many of them bought at varying ages, whilst many of them too, no doubt, though now pure cargo boats, may have been in their fierce youth well-known passenger vessels under other flags.

The North Atlantic Pool.

The differences between the German lines have not yet been smoothed away, and the Hamburg-American Line has announced a cut in its steerage rates to United States ports. For sailings after the 1st January the fares will be 120 marks to New York and ten marks less to other United States ports. This means a cut of about fifty marks from the prices charged to the emigrant public before the commencement of the present differences.

H.M. DREADNOUGHT "IRON DUKE."

THE four battleships of the "Iron Duke" class, of which the name ship built at Portsmouth is now completing for sea and the last, the *Emperor of India*, took the water at Barrow at the end of November, are not so much developments of the "King George V." class as examples of what those ships should have been but for the conservative policy of retaining the 4-in. guns in them instead of fitting 6-in. as an anti-torpedo craft armament, as had been advocated on all hands since the ships were first projected.

Reviewing the ships which have been built during the "Dreadnought" era one cannot help being struck by the peculiar lack of foresight which, first of all, caused the *Dreadnought* to be fitted with nothing more powerful than 12-pounders as a secondary battery, and afterwards, when the increasing size of torpedo craft postulated the largest possible man-handled q.f. gun as their antidote, the 4-in. should have been retained year after year in the face of the fact that all foreign ships were being armed with 4·7-in., 5-in. and 6-in. guns to supplement the main battery.

It is futile to argue that the 4-in. was big enough to deal with the torpedo craft contemporaneous with the *Bellerophon*, *St. Vincent*, *Neptune* and *King George* types, but that the increase in size has been such that 6-in.

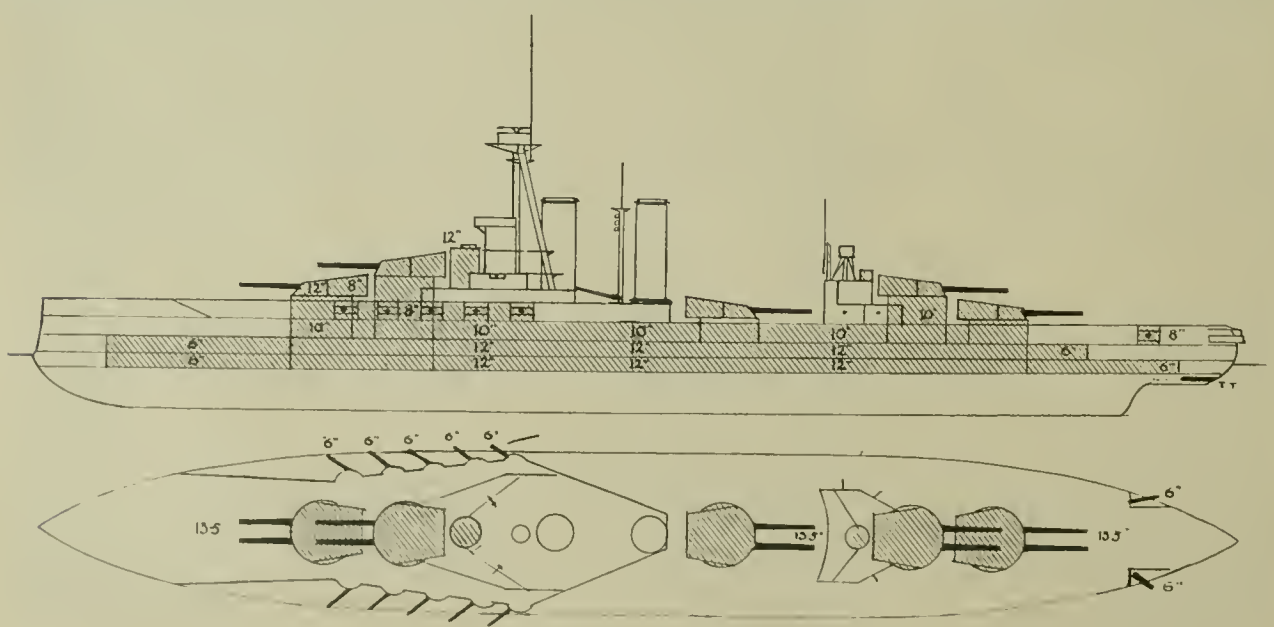
were indicated for the *Iron Duke*. Ships are designed to fight to-morrow as well as to-day, and seeing that there are only a couple of hundred tons or so difference between the big tribal class of 1906 and the boats now passing into service it is obvious that the necessities of the near future could have been provided for when our early "Dreadnoughts" were designed, and 6-in. guns included in their equipment. To re-arm them now would be a difficult, and probably unsatisfactory, proceeding, as the substitution of 6-in. for 4-in. would add close on 2,000 tons to the displacement—in theory. That is to say, supposing that the *Bellerophon* had been fitted with 6-in. in the original design her tonnage would have worked out at 20,600 tons, instead of 18,600 tons, the extra displacement being absorbed in additional weight of guns, fittings, ammunition, armour and engine power to maintain speed. If, therefore, these pre-"Iron Dukes" were given 6-in. now the alterations would probably affect the speed and internal economy of the ships so much that the game would not be worth the candle.

In general appearance the *Iron Duke* greatly resembles the ships that preceded her. The disposition of the five turrets are the same as in the "King George V." class, and the profile is only different through modifications in the rig and funnels. Instead of the pole mast forward, with light tripod struts, the *Iron Duke* has the heavy tripod mast of the earlier all-big-gun ships, while the two funnels are both round and of the same size, instead of the foremost being oblong and double the diameter of the after one. Considering that the horse power of these later ships is in excess of any previous battleships, it is evident that they are intended to realise their power more by the use of oil than coal fuel, otherwise the uptakes would have been much bigger than they are.

The armament consists of ten 13·5-in. guns, firing a 1,400-lb. projectile, and twelve 6-in. The former are mounted two forward, the second turret being superposed, one amidships and two aft, with the fourth firing over the fifth. All ten can thus be trained on either beam, and four in the keel line ahead or astern, the total broadside being 14,000 lbs. as against the 6,800 lbs. of the *Dreadnought*. The turrets have 12-in. faces and 8-in. backs, the bases being 10 in. Of the smaller guns ten are disposed up forward along the upper deck, the forecastle being recessed so as to allow of their being trained well ahead, as shown in the plan. Right aft a couple are carried low down on the main deck and in recessed ports to secure a dead-astern bearing. The exact reason why they should have been so placed is uncertain, as the command is low and likely to be interfered with in rough weather. If desired they could have been accommodated in the after superstructure, as are the 4-in. in the *King George V.*, where a better all-round bearing would have been allowed and any weather would not have interfered with their handling. The explanation seems to lie in the fact that at night torpedo craft can be best spotted from positions low down on the water line, when they show up against the sky, and not from an elevation, when they merge into the sea, hence the after guns in the *Iron Duke* would be excellently placed to deal with hostile boats coming up from astern. Other causes than this, however, may have influenced the design.

The thickness of the armour over the secondary battery is uncertain, although usually given as 8 in. If 6-in. guns are worth mounting they are worth protecting, and protecting adequately, as the experimental firing of the "Town" class with 6-in. and 4·7-in. pieces showed that these small calibres were able to wreck the upper works of the *Empress of India* and turn the ship into a furnace, and consequently are capable of taking a more active part in the battle fighting of the ship than the 4-in. with its light 31-lb. projectile. In the absence of official details it has been suggested that this battery is unarmoured, after the U.S.A. system introduced in the "Nevada" class, which is armoured on the "all-or-nothing" plan, but it is more than unlikely that we should have adopted any such system for the ships under discussion.

The dimensions are: Length, 575 ft. between



Plan of the *Iron Duke*

H.M. Dreadnought, *Iron Duke*

perpendiculars and 620 ft. over all, beam 89½ ft. and mean draught 27½ ft., the designed displacement being 25,000 tons. The *Iron Duke* is thus 24 ft. longer over all than the *King George V.*, and exceeds her tonnage by 2,000 tons—the cost of including the 6-in. guns. Driven by Parsons turbines, having a designed h.p. of 33,000, the speed is to be 21·5 knots, but this is likely to be exceeded by more than one knot.

As may be seen from the plan, the hull is very adequately protected, there being almost complete belts along the water line and lower deck side, and a thick strake running from the fore to the aftermost turret along the main deck. Amidships the w.l. belt is 12 in., tapering to 6 in. towards the extremities and falling short of the cut-water and stern by about 20 ft. Above this the lower deck side is similarly armoured except that the belt ends a little further from the stern; along the main deck the thickness is 10 in., with a probable 8 in. over the batteries. As is customary in our ships there is a 2¾ in. protective deck, which reinforces the main belt and encloses the machinery and vitals.

Forward there is a large 12-in. conning tower with a small observation station aft. Abaft the c.t. forward is a three-decked pile of chart house, cabins and bridges, which is quite as big as that in the *Lion*, and from which the fore funnel is well spaced. In front of the second funnel is a stump mast, from which the boat derrick is swung, and to the head of this the w.t. yards are fitted to sustain the aerials from the foretopmast.

Four torpedo tubes are fitted, and these will discharge the 21-in. weapon. Submarine telephones are also installed, and a special feature is the protection against air craft.

The *Iron Duke* compares most favourably with her contemporaries abroad, as may be seen from the following table:

	England. *Iron Duke.*	Germany. *King Albert*	France. *Courbet.*	Austria. *P. Eugen.*	U.S.A. *Texas.*
Length ..	575 ft.	564 ft	541¼ ft.	495¼ ft.	565 ft.
Beam	89½ ft.	95¼ ft.	88½ ft.	89½ ft.	95½ ft.
Draught ..	27½ ft.	29¼ ft.	27½ ft.	26¾ ft.	28½ ft.
Displacement	25,000 tons.	24,310 tons.	23,026 tons.	20,000 tons.	27,000 tons.
Designed h.p.	33,000	28,000	28,000	25,000	28,000
,, Speed	21·5 knots.	21 knots.	20 knots.	20·5 knots.	21 knots.
Armour Belt	12 in. 6 in.	12 in.	10½ in.	11 in.	9 in. 12 in.
Above	12 in. 10 in.	6¼ in.	7 in.	7¾ in.	8 in. 10 in.
Deck ..	2¾ in.	3 in.	2¾ in.	3 in.	3 in.
Big Guns	12 in.	10 in. 13½ in.	10½ in.	8 in. 11 in.	8 in. 11 in.
A.T.C.	8 in.	6¼ in.	7 in.	6½ in.	8 in.
Armament ..	10 13·5-in. guns.	10 12-in. guns.	12 12-in. guns.	12 12-in. guns.	10 14-in. guns.
	12 6-in. ,,	14 5·9-in. ,,	22 5·5-in. ,,	12 6-in. ,,	21 5-in. ,,
Torpedo Tubes	4 21-in.	5 19·5-in.	4 18-in.	4 18-in.	4 21-in.
Weight of Broadside	14,600 lbs.	10,442 lbs.	10,427 lbs.	12,314 lbs.	14,660 lbs.

Of her sister ships, the *Marlborough* is completing at Devonport, the *Benbow* was launched during November at Beardmore's and the *Emperor of India* (ex *Delhi*) soon after at Barrow. They are the last battleships of the present cycle of evolution to carry the 13·5-in. gun, and the following "Warspite" class have eight 15-in. pieces as their main armament.

THE CHANNEL TUNNEL.—The Channel Tunnel Co., Ltd., have recently issued, in booklet form, full details of the present scheme in its military, engineering and financial aspects. Special articles are contributed by prominent persons and a verbatim report of the proceedings connected with the recent deputation to the Prime Minister is given. A history of the work done in the past is included, with a large number of press opinions.

LAUNCHING ARRANGEMENTS AND CALCULATIONS.

THE most spectacular part of a vessel's career is her launch, which seems such a simple matter to the onlooker, but which is an anxious time for those responsible for its success. Many things may happen to mar the success of the launch as a function, and possibly to endanger the vessel and cause loss of life. When the vessel is released, she may not move down the ways due to her own weight, as she is intended to do, but may stick, causing the loss of a tide, as the launch usually takes place just before high-water, so as to allow the time during the slack period and before the tide is falling as a margin against accident. A flaw, then, in the launching arrangements may cause this period at the top of the tide to be wasted, and there is nothing for it but to wait for another convenient tide.

A more serious state of affairs is when the launch is well under way, and the sliding ways no longer bear for the entire or the greater part of their length on the ground or standing ways. Just as the after end lifts on becoming waterborne, the vessel is in a critical position, being supported aft at the centre of buoyancy of the immersed portion, and forward at the extreme ends of the sliding ways. With the exception of these three points, one aft and two abreast forward, the vessel is unsupported, and is very easily toppled over if there should be any sticking due to too slow a motion at that part, or to a subsidence of the ways, owing to about half of the weight, which was a moment before taken by the sliding ways right from end to end, becoming concentrated at the one spot, their forward ends.

In order to ensure a sufficiently high speed when the vessel reaches that critical point, it is the practice in many yards to camber the ways, that is, to make the ways in the form of the arc of a circle. The result is that, while the speed is slow at the beginning of the launch, it gets greater and greater, due to the increasing declivity got by cambering. The cambering also gives strength against subsidence, which we have noted as being one of the dangers to be guarded against. The amount of camber, or greatest distance between the arched way and the line joining the ends of the way, is usually about one foot in four hundred feet. Care must be taken that the pressure per square foot of way is not so great as to cause the lubricant to be forced from between the surfaces of sliding and ground ways; to prevent this, it is the practice to limit the allowable intensity of the pressure to 2½ tons per square foot, and this, of course, governs the breadth of way, as their length is fixed.

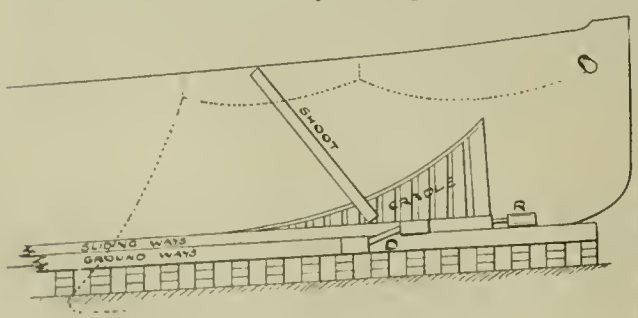


FIG 1

The launching ways are made of different woods, the hardness of which varies with the weight of the vessel. These ways are fitted at about one-third of the width of the vessel apart, and should come beneath some strong longitudinal member, such as a side girder or a keelson, in order that the vessel may not be unduly stressed, due to its weight being localized by the ways. The space between the sliding ways and the vessel is filled in with packing pieces. Towards the ends of the vessel the filling-in takes the form of a cradle (Fig. 1) whose upper edge rests against the edge of a line of shell plating, or against an angle temporarily riveted to the shell for that purpose. To prevent the cradles from spreading when the weight of the ship comes upon them, they are connected together by chains which pass beneath the bottom of the vessel. Till the morning of the launch the vessel has been resting on the building blocks, but before she can be launched the weight of the vessel must be transferred to the launching ways. This is usually done by wedges being driven in between

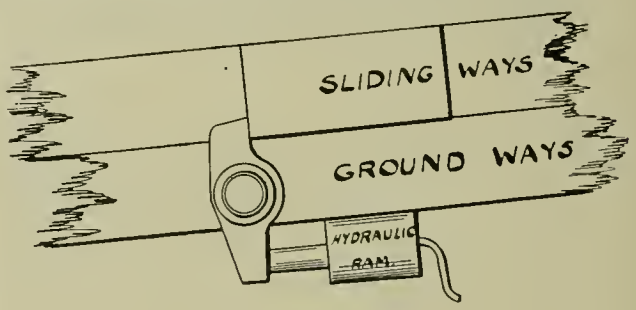


FIG 2

the sliding ways and the packing pieces, so getting the vessel perfectly supported by the launching ways before the building blocks are removed.

When the vessel is resting on the launching ways she must be kept there by some device which, at the required moment, can be readily released. The most common method is to prevent the sliding ways from moving past the standing ways by means of dog-shores D (Fig. 1) fitted between projections on the respective ways. There are two dog-shores, one on either side of the vessel, and these are knocked out at the desired moment by weights which glide down shoots from about the level of the upper deck. A single rope is connected to the two weights, and in passing from one to the other is led over a block on the platform on which the launching ceremony takes place. When it is desired to release the vessel, the rope on the block is cut with a hatchet and the weights released, which in their fall knock out the dog-shores, and the vessel moves off. Other devices are adopted, such as a short lever (Fig. 2) pivoted in the centre to the standing ways, the upper arm of the lever in its vertical position resting against a projection on the sliding way, and the lower arm against the ram of a hydraulic ram, or held by an electric magnet. When

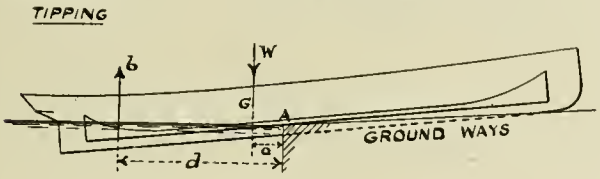


FIG 3

it is desired to release the vessel, water is let out of the ram in one case, or the current is switched off in the other, and the lever moves to a horizontal position, releasing the vessel, which then glides down the ways. In cold weather the grease between the ways is liable to freeze, or for some other reason there may be sticking; it is advisable, then, to have a means provided for ensuring a good send-off if necessity arises. This takes the form of two hydraulic rams (R, Fig. 1), one at the end of each sliding way, by means of which pressure can be applied to them if necessary. To prevent the sliding ways from being forced outwards by the wedge-like action of the vessel, a projecting ledge is fastened, either to the inside of the sliding ways or to the outside of the standing ways.

What has been said applies to an end-on launch, though sometimes the vessel has to be launched broadside-on when the river or dock into which she is launched is very narrow. In an end-on launch, if the breadth of water is limited, the distance run by the vessel must be restricted. In order that the vessel may not run too far in the case when the available breadth of water is limited, various means are adopted. One method is to lead a chain from each hawse pipe along the side of the vessel for some distance aft, tying it up at intervals by hempen lashings (Fig. 1), the ends of the chains being then led forward of the vessel and well anchored to the ground. Soon after the vessel has started down the ways strain is brought to bear on the aftermost lashing, and after some resistance it parts, checking the vessel somewhat; in a short time the next lashing is called on to play its part in the checking of the vessel's speed, and so it goes on. The collective strength of the lashings is determined by the amount of checking required. Another method is to attach weights to each cable in such a manner that all the weights are not taken up at once, but they come into action in succession. These weights consist in piles of chain or of plates which are dragged

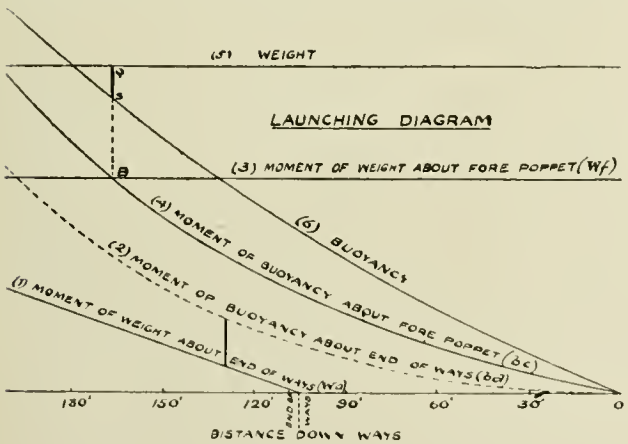


FIG. 4

over the ground, so draining energy from the vessel and slowing her up. A neat and effective way of checking the speed of a vessel is to attach to her after end a transverse vertical shield of wood, to the passage of which the water offers great resistance, and so effectively checks the vessel's motion. Mr. A. Hiley has invented a form of friction brake to take the place of drags, shields, etc. This brake is composed of two wire ropes which are drawn between grooved castings, pressed against the ropes by springs, the tightness of which can be varied as required.

Before the vessel is launched a number of calculations have to be gone into. First it is essential that when she is launched she may be stable, and to ensure this her stability in the launching condition must be carefully considered. If it be found that the vessel will have too little initial stability when launched, consequent on her centre of gravity in that condition being too high, then this can be rectified by lowering the centre of gravity by placing on the top of the inner bottom all movable weights, such as workmen's tools and parts of the vessel not yet fixed in position. The practice of loading the deck with heavy weights, in order to carry them cheaply from the building to the fitting-out berth, is to be condemned, and has led to serious loss of life.

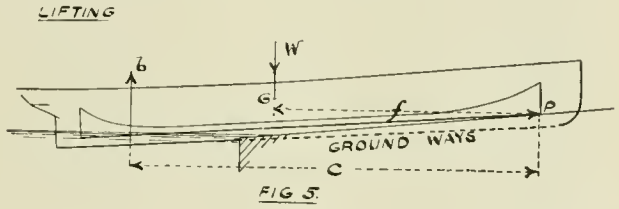


FIG 5.

As already indicated, the total length of the bearing surface of the ways, *i.e.*, the length of the sliding ways, being known, the width of way necessary to keep the pressure per square foot within reasonable limits is calculated from the weight of the vessel. Should this pressure be too great, then the grease may be squeezed out from between the sliding and standing ways, with the result that the vessel may stick in some very dangerous position.

There are several dangers to be guarded against. As the vessel moves down the ways, her centre of gravity approaches nearer and nearer to the end of the standing ways. Just after the centre of gravity of the vessel has passed beyond the end of the ground ways, the fore end will tip up, unless the vessel be sufficiently well water-borne aft to prevent this. This causes the vessel to pivot about the end of the ground ways, so concentrating the weight at that point, which would lead to damage of the structure. In Fig. 3 the vessel is represented at the moment when she tips forward; tipping, then, will take place unless the clockwise turning effect ($b \times d$) about A of the lift (b) due to the buoyancy of the immersed portion, is greater than the anti-clockwise turning effect ($W \times a$) about A of the weight of the vessel. We want to provide that we will always have a moment against tipping. In Fig. 4 curve No. 2 is the moment of the buoyancy about the end of ways, got by calculating the value of this moment for the different positions of the vessel as she moves down the ways. Curve No. 1 is the moment of the weight about the end of the ground ways, and,

in order that the vessel may not tip, No. 1 must always pass below No. 2 curve. The least moment against tipping (T R) is the least vertical distance between these two curves, and if this is not considered sufficient we can increase it by filling up the fore-peak tank, which, by drawing the centre of gravity of the vessel forward, and so nearer to A, lessens its moment about the end of the ground ways, and so lowers R and increases R T. Another way of increasing the least moment against tipping is by building a wooden box round the after end of the vessel; this increases the buoyancy aft, making the moment of buoyancy about the end of the ground ways greater, so raising T and increasing R T.

The next important point is that of lifting, when the buoyancy aft becomes so great that the vessel lifts and is supported forward at the end of the sliding ways (P, Fig. 5). The vessel will tend to lift when the turning effect ($b c$) of the buoyancy about the fore poppet (P) is equal to the turning effect ($W f$) of the weight about the same point. The moment of the buoyancy about P is plotted as No. 3 curve in Fig. 4, and the moment of the weight about the same point as No. 4 curve. Where these cross (B) these moments are equal, and the vessel tends to lift. To get the pressure on the fore poppet when she lifts, we must plot the curves of weight (5) and of buoyancy (6). The vertical distance ($Q s$) between these curves at the point down the ways when the vessel lifts, gives the pressure on the fore poppet, as this pressure is, of course, that portion of the weight of the vessel which is not balanced by the upward pressure of the water on the immersed part. If the lift takes place too early, the pressure on the fore poppet will be too great, as the water will then be doing but a small share of the work; we can prevent premature lifting by filling up the after-peak tank.

COMBUSTION OF OIL FUEL IN MARINE BOILERS.*

I PROPOSE to confine my paper to the practical details of installation and maintenance dealing with several methods of burning oil fuel in marine boilers. At the present date there are many systems in vogue, but in the merchant service we may divide these various methods under three headings :—

Steam with oil
The direct pressure system.
The compressed air system.

The steam with oil appears to have been the earliest successful method, although at the same date, in 1865, a very serviceable burner of the hot-air blast type was introduced into this country. The direct pressure burner was patented at a much later date.

In order that this paper may be of some practical value to those who have not yet acquired what we might call oil fuel experience, I shall commence at the first cycle of operations—bunkering—and endeavour to explain as we proceed, the various important details and the precautions that must be observed in order to burn oil fuel successfully with any system.

It will be seen later that it is of vital importance to have clean bunker spaces. The fuel bunkers of a vessel which has been undergoing repairs should be thoroughly cleaned out, and then examined by a responsible engineer before any fuel is taken aboard. It is a common practice to clean these spaces with sawdust and bagging, and workmen are apt to leave these materials in the bunkers, especially in the double bottoms. Should this item be neglected we may reasonably expect to throw heavier work on the filters, and consequently on the staff. Once these fuel spaces are cleaned in an efficient manner they may be expected to remain so as the installations supplying the fuel take every care to extract any impurities, and further, a filter box of a coarse mesh can be fitted in the filling line. Even with fuel containing impurities a system can be efficiently worked by attention to the filters, but the little labour involved in the cleaning of the tanks is one which is well repaid. The operation of bunkering is a very simple matter, and rapidity of loading depending on the size of pipe through which the bunkers are received, the quantity can be accurately ascertained in a few minutes by measurement with a tape line. Usually, drawings are provided giving the bunker capacities per foot depth; in any case it is an easy matter to graduate a tank by running up 10 tons at a time by arrangement with the installation supplying the fuel, and taking note of the ullages in each instance. Measurements taken in this manner are often found more reliable than builders' figures. After loading, the water finding test may be applied to the first tank loaded, and if any water be present, a few inches or so from the bottom, the tank should be pumped into a settling tank where the water may be readily separated by means of the heating coils, and drawn off.

THE STEAM WITH OIL SYSTEM.—The S.S. *Murex* has been fitted for many years with the steam with oil system, with Wallsend burners. A gravitation tank is fitted at the port and starboard side in the 'tween deck, fitted with steaming coils for the separation of water, and with drains for running off the same. The exhaust from the steam coils can be carried to the waste water tank or to an observation tank. The filling lines to these tanks are so arranged that they may be filled at the same time as the bunkers, and it is a good practice to run a few tons first into these tanks and thus catch and dispose of any water which may have been present in the ship or the shore pipeline. In Eastern climates it is not necessary to use the steam coils as the temperature of the bunker deck is sufficient to assist in the separation of water from oil. At a temperature of about 100 deg. Fah. the water mechanically separates by reason of its gravity. If a more complete separation is desired it is necessary to heat the mixture to about 140 deg. Fahr. Before lighting up fires any water in these gravitation tanks must be run off. This is easily done in the afore-mentioned manner. If the vessel be in a port where it is not advisable to drain overboard, the water may be run into the oil bilges which are quite distinct from the ordinary engine room and stokehold bilges. A special connection is fitted to the fuel pumps for draining these occasionally.

The gravitation tanks have a capacity of 12 tons each. One of the two fuel pumps in the stokehold delivers the fuel to these tanks from any of the bunker spaces r double bottoms—

*Read before the Institute of Marine Engineers, December 15th, by Mr. Jas. S. Gander, Member.

usually the after cofferdam is used for greater convenience in measuring daily consumption. A suction is fitted to each wing of the cofferdam, which is divided by a longitudinal bulkhead. One is a high and the other a low suction. The high suction, about four feet from the bottom of the tank, is used at sea so that no impurities can be drawn into the fuel system The low suction is used for draining water or for emptying the tank. These tanks run for twelve hours each before changing over. The operation of changing over should have no effect on the fires. The incoming tank must be opened up before closing down the outgoing one. Sometimes a little smoke appears at the funnel caused by the difference in the head of oil of the two tanks. This may be anticipated by easing the oil valves in a little before changing over. It is the duty of each engineer, before going on watch, to take soundings of the gravitation tanks and enter the figures in the scrap log so that the consumption may be gauged. The oil flows by gravitation, hence the name, and passes through filters or strainers on its passage to the burners. The filters are in couple for cleaning purposes, and under ordinary circumstances will not need changing more than two or three times a week. In heavy weather they will need cleaning more often as the rolling of the vessel tends to stir up any impurities which may be present in the oil.

After passing through the filters and then through the small intermediate oil valve attached to the burner brackets, the oil reaches the burners.

The burner now described is of the ordinary type, generally known as the Wallsend type, and is the same as the Rusden and Eeles burner. If required, it forms a very efficient burner for the compressed air system, in which case the air should be heated before reaching the burner by carrying the supply pipes through the smoke boxes, much in the same manner as in a forced draught system. In docks, where a steam supply is not available for lighting up, in the event of all ship's fires being out of action, steam may be easily raised by cold compressed air until a pressure of abont 80 lbs. is attained, when the air supply may be shut off and the steam for atomising drawn from the boiler. The steam supply enters at the top of the burner and the oil at the bottom. The steam, after passing round the jacket chamber, enters a hollow spindle through small holes, and its emission from the burner is controlled by an interior spindle. We have thus two separate spindles—one controlling the steam and the other the oil supply. Further adjustments may be arranged by the steam and oil valves on the side brackets. Situated as they are in an average temperature of 100 deg. Fahr. (in Eastern climates) the gravitation tanks need no additional heat from the steam coils, and the oil is further heated a few degrees by contact with the pipes on its passage to the burners. In temperate and cold climates it is advantageous to use the steam heating coils and raise the oil to about 90 deg. Fahr. With the steam with oil system the temperature of the incoming oil is not so important a matter as with the direct pressure system, for the appearance of the flame indicates correct combustion or otherwise, and any deficiency in the heating of the oil from the gravitation tanks may be remedied by a slight adjustment of the steam supply to the burners where the steam jacket gives to the oil the required additional heat.

At the burners the oil is heated by the steam jacketing and shoots into the furnace in a spray of conical shape, accompanied by the steam which atomises or partly splits the oil into its constituent elements. Should the washer separating the steam and oil supplies inside the burner leak, it will be noticed that incandescent sparks of carbon issue from the burner. This has been caused, in the first place, by the man in charge altering the steam supply to overcome supposed defective heating, with the result that too great a supply of steam coming into direct contact with the oil inside the burner atomises the same too completely, and separates the gases almost entirely from the carbon contained in the oil. These washers last six months or more, and no trouble need be apprehended from this source.

Before lighting fires, after they have been out of use for a considerable time, it may be necessary to heat the oil in the gravitation tanks, and to circulate through the supply pipes to obtain a uniform temperature of about 90 to 100 deg. Fahr. The steam pipes should be well blown through to clear water and heat up the burners, and then the steam valve opened very slightly. With a lighted torch held a few inches in front of the burner inside the furnace, and the oil valve opened very slightly, immediate combustion takes place. For a few minutes the combustion is not perfect till the brickwork gets heated, but in a very short time the fires should be burning without smoke. It is advisable to light all fires together and not to raise steam with only one burner in each furnace, as the heating effect in the first instance is much greater with oil than with coal; also to set the burners away very easily, otherwise we may generate steam much too quickly for good boiler practice. For the first few minutes the fires should be set away fairly full in order to heat up the brickwork and then eased down to a minimum.

Efficient circulation should be maintained up to about 30 lbs. pressure, as with coal burning. In boilers fitted with hydrokineters steam can be safely raised more rapidly if these be opened some time before lighting up—say two hours. With respect to the use of hydrokineters, it should be remembered that if these be opened too far, excessive vibration of the boiler is caused, and any deposit at the bottom of the shell is likely to be shaken up and deposited on heating surfaces. Should the fires have been set away too rapidly, the best practice is to shut down altogether when steam begins to show. So efficient is oil fuel as an agent for raising steam that one has to guard against the too rapid generation by inexperienced firemen—on the other hand, by observing the known conditions, no other method of firing is so easy of adjustment, both for raising steam and for manœuvring with engines in and out of port. So effectively can the adjustment of the valves be arranged that a vessel can go from full speed to slow without previous notice, and not lose steam through the safety valves. With coal we should have to partly draw fires, with a loss of fuel, to the detriment of the backends, and then not succeed in preventing the boilers from blowing off.

An important item in the combustion of oil fuel with this system is the regulation of the pressure of

steam supply to the burners. I find from practical experience that the most economical pressure ranges from 25 to 35 lbs. per square inch. This, of course, is arranged in the reducing valve. Strange to say, the consumption of water for burning steam is not greater, and in my opinion, less than the consumption when running the steam supply at 60 lbs. This is accounted for by the fact that steam at 30 lbs. from the same reducing valve and main boiler supply will be drier than reduced steam at 60 lbs. under the same conditions. This is an important feature in the proper pulverisation of the fuel.

I prefer the lower pressure for the following reasons:—

(*a*) The burner flame can be adjusted through a greater range. With too high a steam pressure, and when running burners at a minimum, there is a slight possibility of the flame blowing out.

(*b*) Better combustion of the fuel, as evidenced by the reduced consumption and reduced funnel temperatures.

(*c*) With the low pressure there is no danger to backends should the striking pillar get knocked down without being observed by the engineer on watch.

(*d*) Decreased consumption of water.

The burner steam should be connected with the auxiliary steam line, and should have a separate connection from the donkey boiler. The proper adjustment of the steam and oil valves is a matter which needs very little practice to obtain the best results. The flame jet from the burner should form at a distance of two or three inches from the nozzle and not start directly from the burner, as this tends to deposit carbon on the end. The burner should be set in a central position with regard to the striking pillar, and pointing downwards at an angle so that both the vertical and the horizontal centres are struck. To facilitate the manipulation of the flame jet, the burner is mounted on trunnion joints at the bracket end of the supply pipes. Burner spindles should be set correctly at the commencement of a voyage, and any regulation of supply arranged from the side valves. By this means we ensure that the flame always strikes the pillar at the correct position for economy. When this is the case, the incoming air supply mixes equally with the primary products of combustion, and the deposit of carbon is prevented. With clean burners and filters at the commencement of a voyage, proper attention to filtration and the setting of the burners in the first instance, the latter will not require cleaning for several months. The burners are detached in a few seconds, and usually a spare burner is fitted on trunnions ready to be swung into position should the other on the furnace need overhauling. One burner in each furnace is sufficient for all ordinary purposes.

The brickwork of the boilers should be well laid that it may stand heavy weather. The position of the striking pillar and the area of opening at the neck of the furnace are important factors: without a well-arranged brickwork it is impossible, however well other parts of this particular system may be designed, to obtain the best results. The striking pillar acts as a retarder to the otherwise too rapid passage of the flame, assists the furnace to perform the duty of a heating surface and, being heated almost to a white heat, helps that particular stage of combustion which takes place in its vicinity. Without a striking block we might be using the combustion chamber as a furnace and the uptake as a combustion chamber. The sides of the pillar are strengthened in a simple manner against heavy rolling by the addition of side arches. The area of opening at the end of the furnace should be such that an average man can enter without having to pull down brickwork. A circle of 18″ dia. is sufficient. In the *Murex* the back brick rings enter the combustion chamber for half their length to give support to the brickwork round the saddle plate. The bricks in the combustion chamber are carried to an all-round height of 3″ below the bottom row of tubes. The masonry should last from one docking to another, with the exception of the striking block, where it is necessary to remove the top two rows for access to the backends. Sometimes a brick is loosened by a careless fireman removing the carbon product of incorrect combustion. This may be anticipated by supplying the firemen with light steel tipped slices of $\frac{1}{8}$″ dia., which will remove carbon without damaging brickwork. All studs and nuts for coal burning gear support are fire-clayed over.

The incorrect adjustment of the steam and oil valves may cause a heavy smoke at the funnel and a carbon deposit on the striking pillar. It is generally possible on most vessels to obtain a view of the funnel from below, and smoke can be entirely prevented by examining the appearance of the flames in the various furnaces and regulating those at fault. A thin smoke is rather desirable, as it is an indication that steam is not being wasted up the funnel. Smoke can be immediately stopped by giving additional steam to the burner or decreasing its oil supply by means of the bracket valves. The appearance of the flame in the furnaces, in colour and in form, gives indications of economical combustion or otherwise, and very little experience is necessary to appreciate the differences. With perfect combustion the flame stream commences two or three inches from the nozzle, the intermediate space being filled by a greyish vapour, and wraps symmetrically around the striking pillar in a blaze of brilliant white slightly tinged with yellow. Too brilliant and too white a flame means that too much steam is being used. Excess of steam gives a blueish transparency at the point of contact. With too much oil the flame assumes a deeper yellow tinge and streaks of dark will be observed in the stream from the nozzle. An excess of oil will cause smoke in the furnace and a yellowish red colour to the flame. Still more oil being supplied to the burner, the mixture does not atomise and is deposited in a liquid state on the striking block.

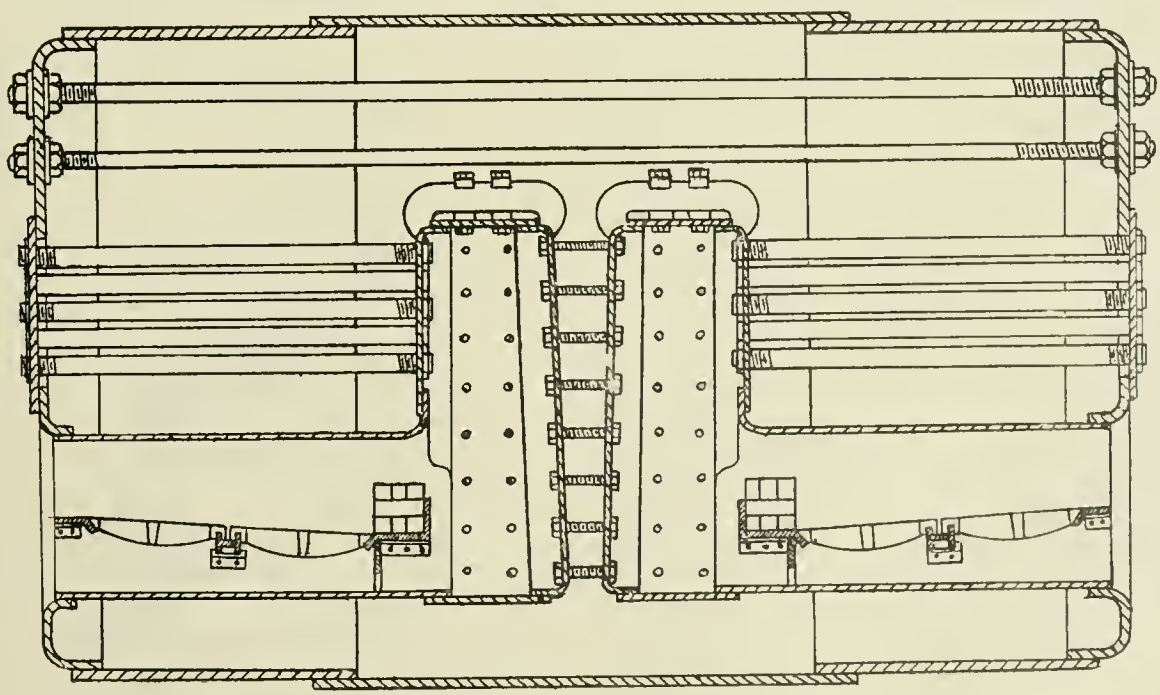
(To be continued.)

THE LIGHTHOUSE LITERATURE MISSION.—We again commend to our readers the good work carried on by this mission, which endeavours to lighten the monotony of the dwellers in lighthouses by forwarding literature—contributed by subscribers—to the various beacons set to guide the mariner and help him on his course to safety. The annual report of the mission contains letters from lightkeepers testifying to their appreciation of the books, magazines and papers received, thus showing that testimony has been given by the recipients, a feature in connection with gratuitous service not always prominent, hence all the more welcome when it is made spontaneously.

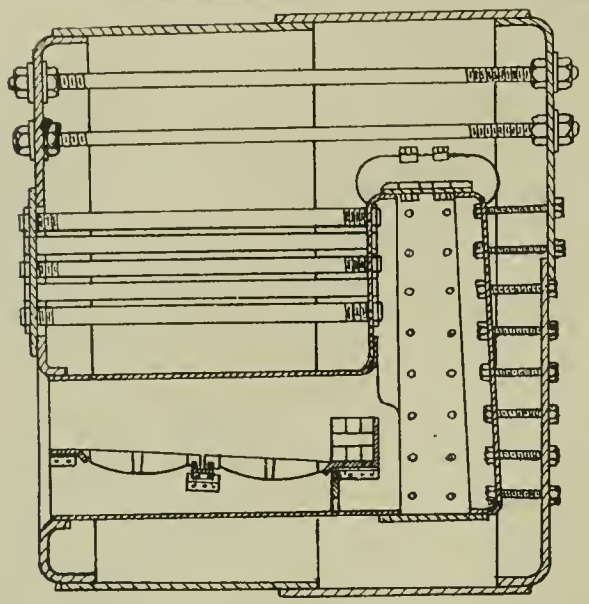
MODERN MARINE BOILERS.

THE above is a subject which covers an extensive field, but in the present article only the better-known boilers will be dealt with. These may be divided into two classes, *viz.*, cylindrical multi-tubular wet-bottom boilers and water-tube boilers; the former, in contra-distinction to the latter, may also be termed fire-tube boilers. As the cylindrical boiler was in evidence before water-tube boilers came to the front it should, perhaps, hold the premier place as far as this article is concerned, a position which water-tube boiler advocates will not grudge it, owing to the fact of its having borne the heat and burden of the day before the advent of the more modern types. The cylindrical boiler possesses advantages which make it suitable for some purposes; at the same time, the presence of certain disadvantages has made the development and progress of the water-tube type rapid. In the present article it is proposed to deal with the construction of the various types of marine boilers in use in this country, and, as previously stated, the cylindrical or Scotch boiler will be dealt with first.

The cylindrical boiler was originally a graduation from the now obsolete rectangular type, and came into general use after the introduction of the surface condenser, which made possible the use of the higher steam pressures that science and experience demanded. By arranging the shell in the form of a complete cylinder the vertical and transverse horizontal stays were eliminated, as the cylindrical shell is self-supporting, owing to the fact that the pressure is balanced at all points. The two common forms of this boiler are the single-ended type and the double-ended type, and while these designations are familiar to engineers yet a further explanation of the terms is necessary. A single-ended boiler is one which is fired from one end only, while a double-ended boiler is arranged to be fired from both ends. Single-ended boilers may be made up to about 16 ft. to 17 ft. diameter, and about 12 ft. in length, the material employed being invariably mild steel. This material is chosen on account of its tensile strength being higher than that of iron, which makes it possible to obtain the requisite strength with a thinner plate than what must be employed when iron is used. The plates must be carefully chosen as regards the tensile strength, as, if the strength is too high, the plates are less ductile and therefore less suitable for flanging or for subsequent expansion under heat. The usual strength of boiler plates may be taken as ranging from 26 to 32 tons, plates used for the formation of the shell being generally of a higher strength than those used for furnaces and end plates. The shell is generally made in two, three or four sections joined together longitudinally by butt joints and double straps so as to preserve the form of a true circle. The joints are secured by treble riveting, and are the only joints in the boiler in which the rivets are in double shear, the necessity for so strong a joint as compared with the other parts of the boiler being due to the fact that there is twice the stress longitudinally as there is circumferentially. The end plates are flanged to form the connection to the shell, which is done by means of lap joints double riveted, a further reason for flanging the end plates being to allow for the expansion of the shell. The flanging may be either inward or outward, the former method being the more generally adopted, the latter method being only carried out when hydraulic riveting is employed. The end plates are made in sections which may number two or three; the bottom section contains the



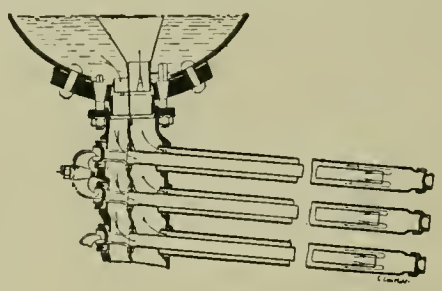
Sectional Elevation—Double-ended Cylindrical Marine Boiler.



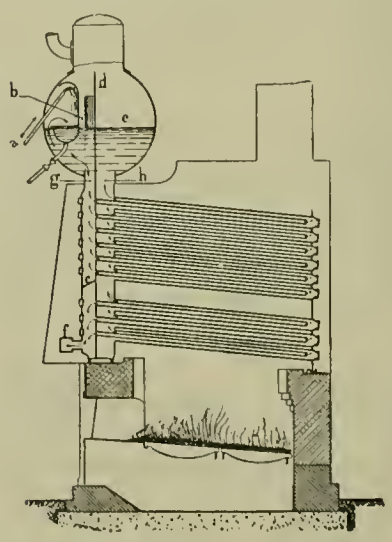
Sectional Elevation.
Single-ended Cylindrical Marine Boiler.

apertures for the reception of the furnaces and the plate is flanged inward to receive them, the top section having the main stays passing through it, and the middle section being formed by the front tube-plate. The back plates of the boiler are usually made in two sections, lap jointed and double riveted. Various types of furnaces are fitted in these boilers, and may be enumerated as follows: Plain furnaces, Fox's, Morison's and Deighton's. Expansion being difficult to allow for satisfactorily in a plain furnace the corrugated type was introduced, and is invariably adopted, owing to the suspensory tendency of the corrugations, in addition to greater ease in expansion. The later types of these furnaces are constructed "goose-necked" to allow for easy withdrawal when necessary. The combustion chambers are of rectangular section, and the general practice is to fit one to each furnace, the thickness of plate being usually slightly greater than that of the furnace. The end plates are tied together longitudinally by the main stays, which will pass from front to back through the steam space, secured by nuts inside and outside. The front plates of the combustion chambers are joined to the front plate of the boiler by means of tubes, which serve to convey the products of combustion from the combustion chamber through the water space to the front of the boiler on their way to the funnel. A certain proportion of these tubes (usually about one-fourth) are made thicker than the others in order to support the flat surfaces of the tube plates, the necessary support being given by the tubes being screwed into both plates. The sides of the combustion chamber are tied together by means of screwed stays, the backs being secured to the back plate of the boiler by similar means. Besides being screwed into both plates, nuts and washers are generally fitted to each end of the stays, or, in the alternative, they are sometimes riveted over and the nuts dispensed with. The tops of the chambers are supported from their own front and back plates by means of dogs or girders and screwed stays fitted with nuts, the fitting of these girders requiring the utmost care to ensure the maximum amount of support being given to the top plate. The bottoms of the combustion chambers, being semi-circular, require no support. In the front plate of the boiler, between each wing and centre furnace, the apertures are cut for the purpose of giving access to the bottom of the boiler, manhole doors, secured with dogs and studs, being fitted to close these apertures. As the cutting away of the plate at this part reduces the strength it is imperative that stays be fitted to support the weakened plate. These stays pass from front to back of the boiler, and are secured in precisely the same way as main stays. The apertures are also flanged inward to form a rib, which helps to stiffen the plate and also serves to make the jointing face for the door. The manholes for giving access to the interior of the boiler at the top are situated usually in the shell plate near the crown of the boiler, and are cut with their longer axis circumferentially, as the strength of the plate is much greater in that direction than longitudinally. In single-ended boilers single riveting is usually employed in all internal riveting, the circumferential and end-plate seams being double riveted.

Double-ended boilers range from 17 to 20 ft. long and about the same diameter as the single-ended type, the diameter in both cases being limited by the thickness of shell plates required, as when the thickness approaches $1\frac{1}{2}$ ins. the difficulties of manipulation in the boiler shops preclude their use. The double-ended



Niclausse Water-Tube Boiler.
Arrangement of the Double Tube.



Niclausse Water-Tube Boiler.
View with Casing removed

boiler may be considered as equivalent to two single-ended boilers placed back to back with back plates removed and shells joined. The screwed stays then tie together the back plates of the opposite chambers. The usual method formerly adopted was to fit a common combustion chamber to the two opposite furnaces and had the merit of cheapness. At a later period each furnace was supplied with its own combustion chamber, a very much superior arrangement to that formerly employed, not one of the least advantages being that only one furnace was rendered idle during the repair of any small defect in the combustion chamber. The general lines of construction followed closely on those adopted in the manufacture of single-ended boilers, with a few exceptions. In the riveting of the circumferential seams of the shell treble riveting was adopted for the middle seam, in order to enable the joint to offer greater resistance to the barrelling tendency of the long shell when under pressure. Another difference was in the method of supporting the combustion chamber tops sometimes adopted. Instead of the ordinary girders usually fitted, angles are riveted to the tops of the chambers and corresponding angles to the crown of the boiler shell, suitable stays being fitted between the angles. This form of support thus serves a double purpose, besides its legitimate duty of supporting the chamber top it also acts as an anchor to the chamber, thus relieving the back-end stays of the bending action due to the floating tendency of the chamber. In most other respects the construction of the boilers is identical, and calls for no further remarks.

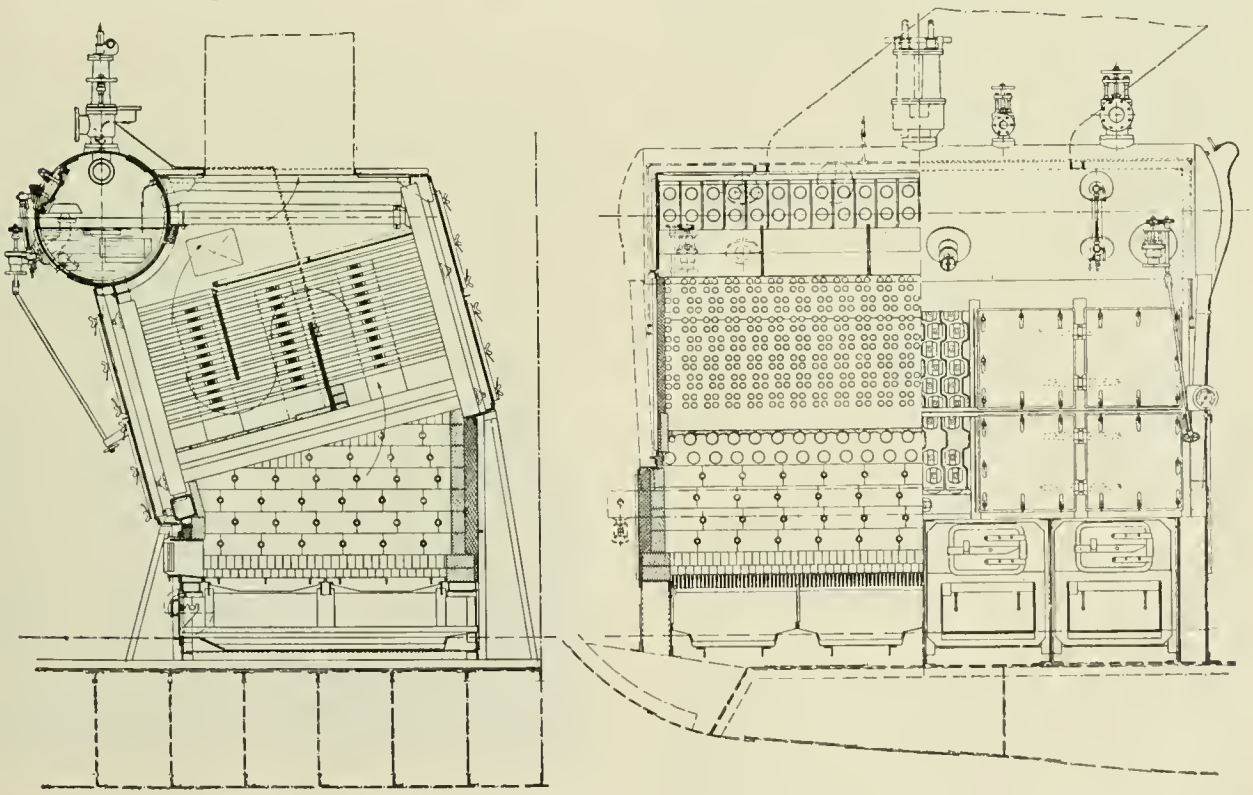
WATER-TUBE BOILERS.

While the successful introduction of water-tube boilers is an accomplishment of modern times yet the idea is an old one and dates back to the beginning of the nineteenth century, and it is very probable that only the absence of facilities for manufacture, combined with the absence of engines suitable in construction for the use of high pressures, prevented their introduction at that time. So that since that date up till recent years the cylindrical boiler held the field, and although the merits of the water-tube type were perfectly well known, it was not until evaporators came into general use (thus ensuring a feed water of good quality) that water-tube boilers came to the front. There are five conditions which must exist to make the operation of water-tube boilers successful, *viz.*:—

Simplicity of design and construction.
Capability of easy cleaning and repair.
Proportionate steam space in relation to heating surface.
Constructed of mild steel.
Provision of feed water as pure as possible.

The boilers may be divided into three classes—straight tube, bent tube and double tube, these classes being further sub-divided into large-tube and small-tube types. The construction of a few representative types may now be considered.

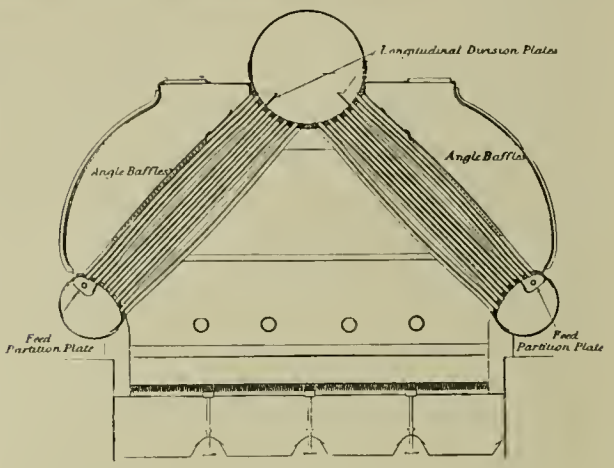
Babcock & Wilcox. The marine-type boilers manufactured by this Company are made in two designs, *viz.*, large tube and mixed tube, the latter being a combination of large and medium-sized tubes. The various parts of these boilers exposed to pressure are entirely constructed of mild steel, so that they can take their place for reliability alongside the cylindrical type. The complete boiler is built up by the assembling of a number of sections, a feature of this boiler which will be dealt with in a future article.



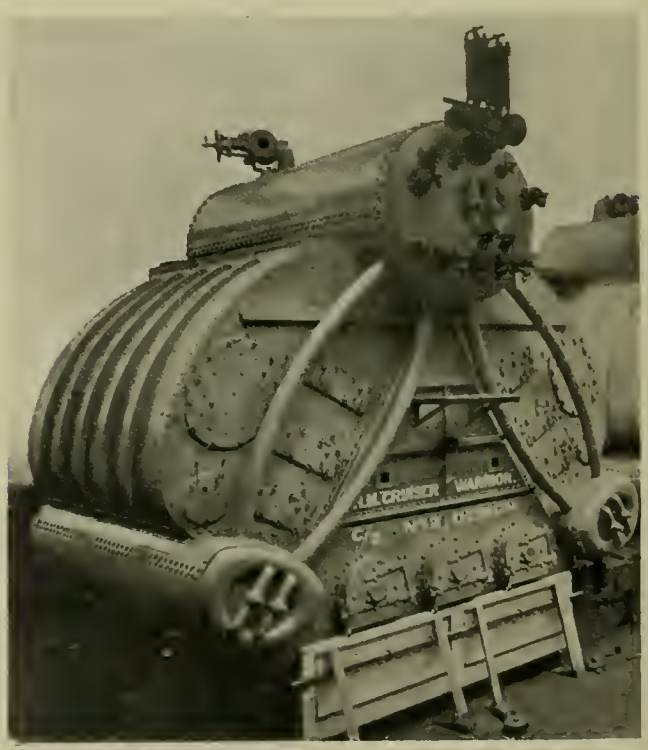
Babcock & Wilcox Marine Type Boiler, as fitted to vessels in the Mercantile Marine.

These sections consist primarily of two forged steel headers, with straight tubes about 8 ft. long extending between the headers and secured to them by expanding the ends of the tubes. The sections are placed vertically and tilted forward, so that the tubes are inclined at an angle of 15° from the horizontal, this arrangement ensuring a positive circulation. Extending across the front of the boiler is a horizontal steam and water drum made in sections and joined longitudinally by butt straps, the drum being connected to the upper ends of the front headers by short tubes, the upper ends of the back headers being also connected to this drum by horizontal tubes; each section being thus provided with an inlet and outlet for steam and water. A forged steel box of square section is placed horizontally underneath the lower ends of the front headers and is connected thereto by short pipes, and being situated below the lowest point of the tube sections, is intended for a sediment box, a blow-off connection being attached, through which the boiler may be completely drained. The front and back headers to which the tubes are attached are made sinuous, by which arrangement the tubes are staggered, thus ensuring the complete break-up of the products of combustion and the efficient contact of the latter with the heating surface provided. This boiler being of the so-called open tube type, necessarily delivers the water from the back headers into the steam space, so that baffle or deflecting plates are fitted in the interior of the drum, causing the water to be thrown downwards, the steam escaping round the ends of the baffles to the steam space. The steam and water drum is also fitted with wash plates to prevent undue movement of the water when the ship is rolling heavily. From each end of the steam and water drum large tubes are connected to the sediment box and are termed downcast tubes; they serve to connect top and bottom when circulation is going on. As already mentioned, the headers are generally constructed of forged steel welded together, but recently they have been successfully made by being solid drawn from an ingot, thus ensuring absolute reliability. Seamless tubes are also in use, thus eliminating the ever-present risk due to the use of welded tubes which proceeds from the element of weakness associated with any weld. Opposite the end of each tube in the header is a handhole, through which the tube can be examined, cleaned, or, if necessary, renewed, these handholes being closed by a forged steel door and stud, the door being drawn up on its joint by means of a forged steel cap and nut.

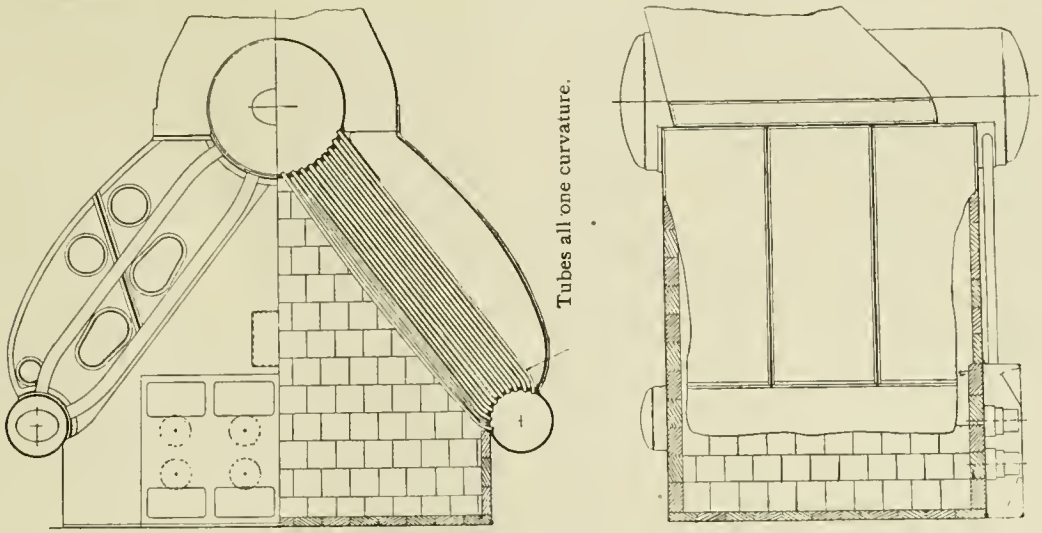
Niclausse Boiler (*Britnic*). This well-known boiler has its home in France and is an example of the double-tube type. The boiler consists of three principal parts, the tubes, the headers, and the steam and water drum. The tubes are made in two parts, *viz.*, an outer tube in which the water is evaporated, and an inner tube to carry the water to be evaporated to the back end of the outer tube. The inner tube also serves the purpose of a feed-water heater. The outer tube is made of solid-drawn mild steel and is closed at the back end with a screwed cap which is designed to be easily removable. The front end of the tube is swelled and has two coned surfaces which fit into corresponding coned holes in the front and back walls of the header. Between these two cones two oblong ports are cut out of the tube which communicate with the compartments in the header allocated to the descending water and rising steam respectively. The method adopted in machining the cones simultaneously ensures that every tube will be strictly interchangeable. The inner tube, when the boiler is under steam, is full of water, and being in communication with the outer tube through its back end it is obvious that the internal and external pressures to which it is exposed are equal, therefore the necessity for a heavy tube is non-existent; so that the tube can be made of relatively thin sheet steel. The front end opens into the front division of the header and is connected by a strap to a screwed head so designed that it will screw into and close the front end of the outer tube. The headers to which the tubes are connected are made of



The Yarrow Water-Tube Boiler.
Showing Angle-Iron Baffles on Outside Rows of Tubes.



One of the Yarrow Boilers, as fitted in the Cruiser *Warrior*.

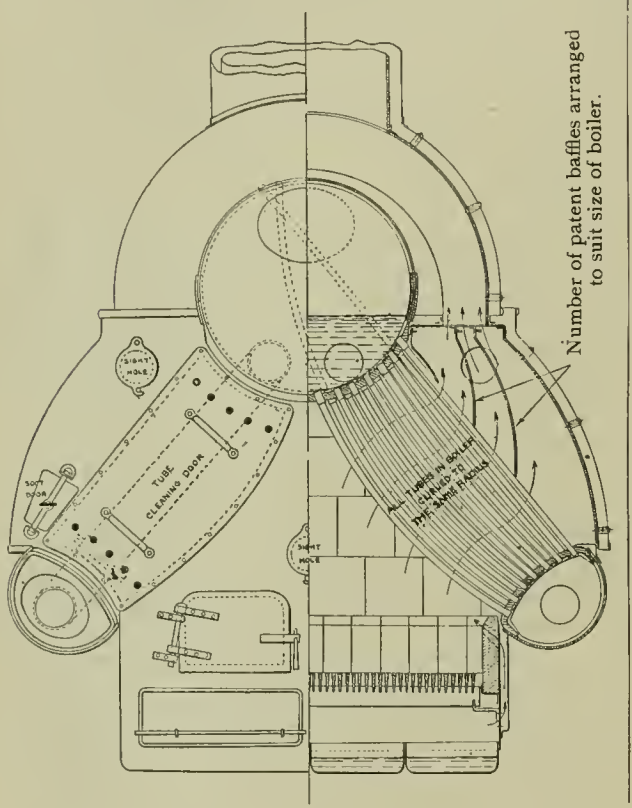


Latest type of Thornycroft Water Tube Boiler.

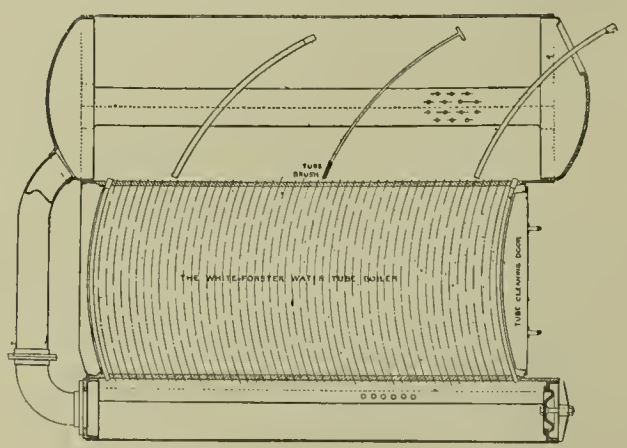
solid drawn steel of square section, and are arranged vertically in the boiler. They are constructed with a central internal division plate which divides the header into two compartments, the front compartment being for the descending water and the other one for the ascending steam. The holes in the headers for the tubes are arranged staggered so that the gases of combustion may be broken up and the best transmission of heat obtained. The method adopted of jointing the tubes in the headers is an important item in the manufacture of the Niclausse boiler, the friction existing between the jointed cones being abundant in resisting power to the small pressure tending to drive the tube out of the header. In order however to prevent the tubes being loosened by shocks or excessive vibration a light bridge piece is fitted as a safeguard. The top end of the header is cylindrical and machined all over, being tapered for a depth of about two inches, this taper forming the joint between the header and the steam drum where it is inserted into a corresponding coned-hole in the saddle-plate of the drum. A steel collar is fitted to the upper part of the header in order to take the bolts connecting the header to the drum. These bolts are made with tapered heads fitting into tapered holes in the saddle-plate and so a steam-tight joint is ensured. The steam and water drum to which the headers are attached is cylindrical and made of mild steel boiler-plate, the length of the drum being made to suit the number of headers communicating with it, usually about fifteen in large boilers. The bottom of the drum is specially strengthened by a thick steel saddle plate riveted to the drum and to which the headers are attached. A sediment box in the form of a trough is fitted inside the drum, and into this box the feed water is delivered, so that a large proportion of the insoluble impurities is deposited in the trough and removed by means of the blow-off cock. The back compartment of each header is surmounted by an internal pipe inside the drum, with the object of separating the up-flow of steam in the back compartment from the down-flow of feed water in the front compartment. A steam dome is constructed on the drum fitted with an internal slotted steam-pipe to ensure dry steam being supplied. The back ends of the tubes are supported by vertical cast-iron plates, which also serve to protect from the flame the caps closing the back ends of the outer tubes. The later designs of the Niclausse boiler show some improvements in the manufacture, amongst them being the introduction of solid drawn steel headers to take the place of the malleable cast-iron article originally fitted, thus securing to these boilers the advantage of increased reliability and security.

Yarrow Boiler. The Yarrow boiler may be taken as an example of the small-tube type boiler, and in cross section presents the appearance of a triangle. It consists essentially of an upper horizontal steam and water drum, from which project two nests of tubes with a water chamber at the lower extremity of each, the fire-grate and combustion chamber being arranged between the two nests of water tubes. The upper steam and water drum is of circular form, and is either a weldless cylinder or constructed of mild steel plates joined longitudinally, the under part of the drum being made of extra thickness, to give a good area of metallic contact with the tube ends. The ends of the steam drum are made dished or convex and of sufficient thickness to obviate the use of longitudinal stays. The tubes of this boiler are usually made straight and are constructed of solid-drawn mild steel, having an average diameter of about $1\frac{1}{4}$ inches, the largest diameter being $1\frac{3}{4}$ inches and the smallest size fitted being 1 inch diameter. The lower water chambers are constructed in two parts and are also of mild steel, the bottom portion of the chamber being semi-circular, the upper portion consisting of a dished tube plate of increased thickness to receive the water tubes. The two portions are joined together longitudinally, and like the upper drum, are fitted with dished ends to obtain the necessary strength without having recourse to stays, which in boilers of the water-tube type are most inconvenient. Man-holes are cut in the dished ends of the upper drum and lower water chambers to give access to the interior. Each water chamber is divided internally, so that the two or more rows of tubes most remote from the fire serve as feed heaters, up which the feed ascends, thus augmenting the efficiency of the boiler, and any sediment that may

collect is deposited in the feed-heating tubes, rather than in those subject to more intense heat, and thus obtain increased durability. In order to counteract the tendency of the feed water to short circuit down the adjacent rows of tubes without first mixing with the water in the upper drum, longitudinal plates are fitted on each side of the shell of the upper drum, so as to partition off the feed-heating tubes. The tubes are secured in the bottom water chambers and the upper drum by expanding in the usual manner, and, in addition, the ends of the tubes in the drum and chambers are bell-mouthed, thus successfully resisting any tendency of the tubes to draw. Angle-iron baffles are placed on the outside row of tubes, in order that the furnace gases may pass uniformly through the nest of tubes. Without the use of these baffles the furnace gases have a tendency to pass too readily to the funnel, and so the efficient transmission of heat to the heating surfaces is reduced. By the judicious arrangement of these baffles a high efficiency is secured, and as the baffles are easily removed, they do not interfere with efficient cleaning of the boiler. A large casing is built around the boiler enclosing the generating tubes and furnace, and is constructed of asbestos-lined plates, suitable doors being fitted to allow of the removal of soot from the bottom of the casing, the casing in way of the furnace being lined with firebrick. The furnace and ashpit doors are so arranged that, in the event of a water tube bursting, all doors will close and so retard the escaping steam as much as possible from entering the stoke-hold. The Yarrow boiler is equally adapted for burning liquid fuel when the usual high efficiency is maintained.


Number of patent baffles arranged to suit size of boiler.
TUBE CLEANING DOOR
ALL TUBES IN BOILER CURVED TO THE SAME RADIUS
SIGHT HOLE
SIGHT HOLE
ASH DOOR

Front Elevation. Section.



The White-Forster Water Tube Boiler.

Thornycroft Boiler. The latest type of boiler manufactured by this firm presents, like the Yarrow boiler, the appearance of a triangle, and also consists like it of an upper steam and water drum and two lower water drums, with the usual arrangement of tubes between the upper and lower drums. The upper drum is of cylindrical form, the lower part of the drum being considerably thicker than the rest of the shell in order to give a good bearing surface for the ends of the tubes. The tubes are made of solid-drawn mild steel, the middle rows being straight, the outer and inner rows being curved at the bottom end to allow for expansion and to enable the cylindrical form of the lower drums to be retained. The curvature of all tubes of one diameter is made similar so that the spare tubes can be made of the greatest length required, and afterwards cut off to suit any row. Two sizes of tubes are in use in the Thornycroft boiler, *viz.*, $1\frac{3}{8}$ inch tubes in the two rows contiguous to the fire, and $1\frac{1}{8}$ inch tubes in the other rows. The tubes are secured in the upper and lower drums by expanding in the usual way, and further security against the tendency to draw is gained by making the tube ends bell-mouthed. The lower drums are usually constructed of seamless steel, thus doing away with the necessity for a longitudinal seam and the consequent liability to leakage which such seams usually entail. The ends of the upper drum are of the dished type, as are also the ends of the lower drums, manholes being cut in the dished ends to give access to the interior. The two outer rows of tubes in each nest are partitioned off in the lower drums, thus enabling the feed water to be admitted to the rows thus separated, and which are thereby transformed into feed heaters. Large downtake tubes are fitted from the upper drum to the lower drums, thus securing positive circulation while the boiler is at work. Special attention is given in this boiler to the judicious placing of the baffle plates on the outer tubes, in order to arrange the passage of the furnace gases to the uptake in such a manner as to derive the greatest benefit from the heating surface of the tubes.

White-Forster Boiler. This boiler is another example of the small-tube type, and, like the Yarrow boiler, resembles a triangle. It consists of an upper steam drum and two lower water drums, two nests of generating tubes connecting the upper drum to each of the lower drums. The tubes are slightly curved, the radius of curvature being the same in each tube, and the tubes, when in position, resembling in appearance the staves in a barrel. Owing to the curve in the tubes they can be easily cleaned internally and also lend themselves readily to withdrawal. The upper drum is constructed of steel and joined longitudinally, the ends being made of dished plates to give the necessary strength without staying. The lower drums have curved bottoms and dished tube plates joined together longitudinally, the tube plates being of increased thickness for the reception of the tubes, as is also the lower part of the upper drum. The ends of the lower drums are flat and have access holes cut in them, these manholes being closed by the ordinary type of manhole door. A large downtake pipe leads from the upper drum to each of the lower drums, and these are, of course, situated outside the casing to ensure that their function shall be fulfilled. The generating tubes are secured in the ordinary way by expanding, the downtake pipes being jointed to the ends of the lower drums. The arrangement of baffles in the uptake is unique, and consists of dividing the uptake into two or more parts, according to the size of the boiler, the division being arranged in such a manner that the furnace gases are drawn equally over the whole tube surface and, at the same time at right angles to it, thereby securing a high efficiency of the heating surface.

REVIEWS.

Navigation, Practical and Theoretical. By Commander David Wilson Barker, R.N.R., F.R.S.E., and William Allingham. London: Charles Griffin & Co., Ltd. Price 3/6 nett.

THIS elementary manual in navigation which has passed through two editions was compiled to meet the wants, not only of the beginner, but also of the practical navigator. The third edition now before us has no general alterations, but the interesting instrument known as the gyro compass is briefly discussed and a short explanation of the apparatus and its uses is added. The treatment of the subject is thoroughly successful and at the same time is as free as possible from abstruse technicalities, the style adopted being such as to render it easy for the young sailor to gain a knowledge of the elements of his profession by private reading and given average intelligence without any difficulty.

A Manual of Elementary Seamanship. By Commander D. Wilson Barker, R.N.R. London: Charles Griffin & Co., Ltd. Price 6/- nett.

THE original edition of this work was published in 1896, since which it has passed through four following editions and the one now before us, the sixth, a fact which speaks for itself as to the popularity of the work and the measure of appreciation it has met with from those for whom it has been written. The book now contains 260 pages and is divided into seven main headings, the letterpress being illustrated by twenty-six plates, three of which are colored and sixty-four diagrams. This edition has been revised and brought up-to-date and includes chapters on storms ,radio-telegraphy and strains and a copy of the latest rules of the road, which under the present Board of Trade Examination have to be learnt by heart by the candidates. Seamanship embraces a wide field of knowledge, as it is the art of handling a ship with all its appurtenances and crew. This involves navigation, pilotage, anchoring, avoidance of collision, cargo work and cognate subjects largely dependent on mathematics and physics, but with all this practice, nerve, judgment, resting on experience, become the dominant features of the successful and capable seaman. The excellent treatment of the multifarious subjects by the author will enable the book to command in the future the same and probably greater appreciation than it has in the past.

Computations for Marine Engineers. By C. H. Peabody. London: Chapman & Hall, Ltd. New York; John Wiley and Sons. Price 10/6 nett.

THIS work has been written for the purpose of inculcating certain methods of computing the proper size and strength of the parts of a marine engine similar to those in good practice with special attention to instruction carried to a somewhat greater degree of refinement. While the practice of making proper drawings based on computations within the limits of a technical school may have a certain amount of utility for the student, the author's view is that greater advantage accrues if the student has the opportunity of joining to his habit of study the consideration of a large problem from the point of view of the engineer. In this way he gets to know his limitations and gains confidence in working by himself and his resourcefulness is encouraged thereby. The book is divided into six chapters, comprising preliminary computation, indicator diagrams, forces and rotation effects, computation of strength, balancing engines and internal combustion engines. Comprising as it does only just over two hundred pages, it follows that over such a wide range of subject only the salient points to be observed by the designers are dealt with, the tables, data and other detail must, of course, be obtained from the usual sources.

Extra Masters and Masters and Mates' Handbook to the Board of Trade Examinations. By Charles Morris, F.R.Met.Soc. London: S. G. Madgwick. Plymouth: Brendon and Son, Ltd. Price, 10/6 nett.

THIS work has already passed through two editions with considerable success, and the third edition under review has some material alterations compared with the previous editions. Every student at sea is under a distinct disadvantage compared with the student on shore, as his preparatory work has necessarily to be done by text book study without the advantage of explanatory lectures and scientific demonstration of the lecture hall, consequently the more complete the text book the more value to the student at sea. The new edition runs into nearly 600 pages, including the answers, and has a large number of diagrams and tables. The alterations to be noted are the omission of the Lunar Problem, the extension of the chart-work, the introduction of a second method of working the tidal soundings, the use of the direct method of double altitude instead of Ivory's method, the addition of answers to deviation questions for extra masters' examinations, and the inclusion of a section on Instruments and general problems by Mr. W. I. Liddicoat. The perusal of the work is sufficient to indicate clearly the clear thought, method, and ability displayed in the compilation of the varied matter which must necessarily be treated to make the text book the complete work it is.

Boilers, Marine and Land, Their Construction and Strength. By Thomas W. Traill, F.E.R.N. London: Charles Griffin & Co., Ltd. Price, 10/6 nett.

THIS is the fourth edition of the work which has become generally known as "Traill's Boilers," dealing with questions concerning the construction and strength of boilers, more especially from the point of view of affording ready and reliable assistance to those who have to settle the scantlings and determine the suitable working pressure of boilers. The rules and tables contained in the book may be taken as the crystallized result of the author's life-long experience, which, as is well-known, was closely associated with marine work. His official position, however, included duties involving the enquiry into all cases of boiler explosion, whether on land or on British vessels, consequently he thus obtained an almost unique knowledge of the proportions necessary to ensure safety. No person responsible for the design and maintenance of boilers ought to be without this extremely concise and useful work.

FOREIGN NOTES.

Austria-Hungary.

THE cargo steamer *Numidia*, built at the San Rocco shipyard at Trieste, has undergone her trial runs very successfully, her engine developing 2,300 i.h.p. and the vessel attaining a speed of 11 knots.

France.

The Normand shipyard at Havre has a cargo and passenger motor vessel in course of building for the Congo, to the order of the Messageries fluviales. The motor is of the Diesel type of 400 i.h.p., with six cylinders and the speed of the vessel will be 13·5 knots.

The mail steamer *Patria* has just been launched at the Chantiers de la Seyne, where she has been built to the order of the Cyprien Fabre Co., for the Mediterranian and New York service. Her length is 160 m. She has accommodation for 140 first-class, 250 second and 1,900 third-class passengers. She will be delivered to her owners in February next, when she will at once start on her first voyage to New York. The cargo steamer *St. Louis* has been launched at the Ateliers de France, at Dunkirk, where she has been constructed to the order of the Navale de l'Ouest Company. Her length is 107 m., greatest beam 16 m., moulded depth 9·6 m. and her speed will be 10½ knots. The English steamer *Olendad* has been bought by the Messageries Maritime Co. from the Elder Dempster line for the sum of 500,000 francs. The vessel was built in 1898 and she can carry about 4,000 tons. She will be employed in the Black Sea trade.

Germany.

The *Teneriffa* cargo steamer has just been launched at the Koch shipyard at Lubeck, built to the order of Oldenburg-Portnguese Steamship Co. at Oldenburg. Length 88·39 m., beam 12 5 m., and carrying capacity 3,100 tons. Her propelling machinery develops 1,400 i.h.p. and her speed will be 11 knots. The *Maryland*, cargo and passenger steamer has been launched at the Tecklenborg shipyard at Bremerhaven, to the order of a Danish shipping company at Copenhagen. Length 126·4 m., beam 17·01 m., and 8,200 tons carrying capacity. Her machinery will develop 2,400 i.h.p. and her speed is to be 11 knots. The *Leda* tank steamer was launched at the Howaldt Works at Kiel, where she has been built to the order of the German American Petroleum Co. at Hamburg. Her length is 121·2 m., beam 18·3 m., and 10,000 tons carrying capacity. She will develop 2,300 i.h.p. and will have a speed of 10·5 knots. The *Canustadt* cargo and passenger steamer, built to the order of the German Australian Steamship Co., Hamburg, has been put through her trial runs at Flensburg. Her carrying capacity is 9,000 tons.

The *London*, a motor vessel has been put through her trial runs at Geestemünde, they were quite successful, and her contract speed of 10·5 m. knots was attained. She has been built to the order of the Royal Dutch Cargo Steamship Co., and her main dimensions are as follows :—Length 84·7 m., beam 12·5 m., and her displacement is 3,350 tons. The German Levant Line at Hamburg has lately acquired two English steamers for the sum of £35,000, and a French steamer for £29,000. This Company has also in course of construction three cargo steamers, two being of 5,600 and one of 3,000 tons.

The cargo and passenger steamer *Mark*, built at the Vulcan shipyard at Vegesack for the North German Lloyd at Bremen has been put on her trial runs, when she developed an engine power of 4,500 i.h.p. and attained a speed of 12·5 knots. Her carrying capacity is 11,000 tons on a length of 149·3 m., beam 18 m., and a moulded depth of 12 m. The *Mark* is destined for the Australian trade.

The cargo steamer *Pfalz*, built to the order of the North German Lloyd has been launched at the Vulcan shipyard at Vegesack. Her length is 140·3 m., beam 17·9 m., and moulded depth 11·95 m., with a carrying capacity of 11,000 tons on a draught of 8·2 m. Her engine will develop 4,500 i.h.p. and propel her at a speed of 12·5 knots. She is to be employed on the Australian trade. The cargo steamer *Schneefeld* built to the order of the Hansa Steamship Co. at Bremen has been successfully launched at the Flensburger shipyard. Her length is 130 m., beam 17 m., and her moulded depth 10 m., with a carrying capacity of 9,000 tons.

Holland.

The cargo and passenger steamer *Insulinde*, has been built to the order of the Dutch Lloyd, at Rotterdam, has just been successfully launched at the De Schelde shipyard. Her length is 151·7 m., beam 17·3 m. and her moulded depth 11·6 m. She will be equipped with two triple-expansion engines, developing 7,000 i.h.p., which at 80 r.p.m. will propel her at a speed of 15 knots. The *Insulinde* will have a complete outfit of all modern improvements to make her specially suitable for the Far East trade, as she is destined for trade with the Dutch East Indies.

Italy.

The keel of the first of the new Dreadnoughts is to be laid down in the course of January, 1914, at the Spezia shipyard. It is reported that its displacement will be 28,000 tons, the length 185 m. and the speed 24 knots.

The s.s. *Dora*, a cargo steamer, has been recently delivered by the Cantiere Navale to her owners, the Austro-Americana. She attained on trial an average speed of about 13¾ knots half loaded. The vessel, which has the following dimensions, 418 ft. by 54 ft. by 37 ft., will be engined by Messrs. Rowan and Co., and is a sister ship of s.s. *Lucia*, formerly described in these columns. S.s. *Tris*, a single-deck cargo steamer of 9,600 tons deadweight capacity, built in same yard for Mr. Marco M. Martinolich, Lussinipiccolo, was launched on Nov. 31st, and will be delivered in January. Her dimensions are 720 ft. by 54 ft. by 30 ft. 6 in. The contract speed is 11 knots. S.S. *Laguna*, built by Cantiere S. Roco for the Navigazione Libera Triestina, has been just delivered, and is the fourth of five sister ships built in Austrian yards for the same owners. The speed on trials averaged 11¾ knots for several hours. The dimensions are 390 ft. by 54 ft. by 32 ft., and about 8,700 tons deadweight capacity. The engines are by The Clyde Shipbuilding and Engineering Co.

Japan.

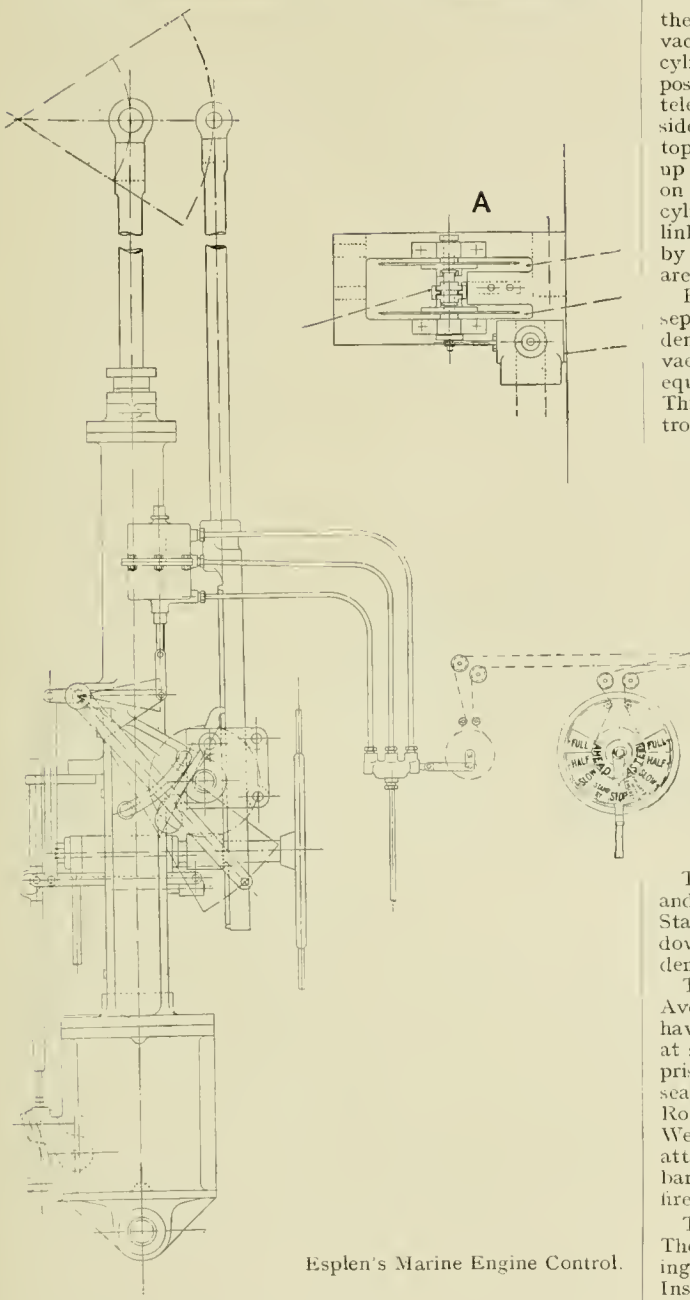
It is stated that the new battleship to be laid down is to have a displacement of 31,300 tons, and that the fleet programme for 1913-14 will include three such further large battleships. It is reported that the Authorities intend to have a second battle cruiser of the "Kongo" type built at an English shipyard.

Russia.

At the Nikolajew shipyard the first battleship for the Black Sea fleet, the *Imperatriza Maria* has been successfully launched. She is said to have a speed of 21 knots on a displacement of 22,000 tons. She is equipped with turbines of the Parsons type, which develop 25,500 i.h.p. Two torpedo boat destroyers were also launched at the same shipyard; their displacement is to be 1,100 tons and speed 34 to 35 knots. Parsons turbines are provided and the boilers are heated with oil fuel. The new Ziese shipyard at Riga is said to have an order for nine large torpedo boat destroyers from the Admiralty.

MARINE ENGINE CONTROL.

A demonstration of a gear controlling marine engines direct from the telegraph instruments was given on board the ss. *La Negra* in the Brocklebank Dock, on November 28th. Mr. Alex Esplen is the inventor of the control and the demonstration convincingly proved the advantages claimed for the invention by him. The chief advantages are as follows :—(1) The action of the engine is in absolute accordance with the order on the telegraph, it being absolutely impossible for the engine to move otherwise than as indicated. (2) It is a true indicator to the officer on the bridge of the exact movement of the engine. As the officer sees the reply pointer come to the position of his order he knows that the engine must be moving in accordance with this order. If by chance the engine should not respond, and the engineer in charge requires to put his gear momentarily in the opposite direction, he swings his telegraph back, and by so doing indicates to the officer on the bridge what has happened. The officer then knows that until he sees the reply pointer back again in accordance with his order, his instructions have not been complied with and can consequently make the necessary allowance in his calculations. (3) All chance of discrepancy between orders from the bridge and their execution in the engine room



Esplen's Marine Engine Control.

is avoided. (4) In case of emergency when the gear is connected to the bridge telegraph, the officer in charge can immediately stop and reverse the engines direct from the bridge. With a twin-screw vessel and using this gear, he may leave one engine full ahead, putting the other full astern, which, with the helm hard over, enables him to head his vessel off to a very great extent. The value of the ability to do this needs no further comment.

The control is operated by vacuum and the arrangement is simple. Connected to the telegraph leads are two gear wheels, one to the engine room telegraph leads and the other to the bridge telegraph leads. By means of a sliding clutch feathered to a small disc shaft, either of these wheels may be made to operate a piston valve. The function of this piston valve is to communicate the condenser vacuum to a vacuum cylinder in such a manner as to operate upon the pistons of this cylinder, so as to give three positions: "full in," "central," "full out." The piston valve and vacuum cylinder are of special design. When the telegraph handle is at the top position, the piston valve is "central," and vacuum is admitted to the centre of the vacuum cylinder between its pistons, thus giving the mid position for the reversing engine control valve. If the telegraph handle is moved on to the slow-position on either side, so is the piston valve moved, and vacuum admitted to top or bottom of the vacuum cylinder, moving the piston rod up or down and giving the "ahead" or "astern" position on the reversing engine control valve. A further vacuum cylinder is provided for closing the throttle valve, while the links are being swung. This cylinder which is also controlled by a piston valve keeps the throttle valve shut until the links are well over on either side.

For starting purposes on vessels not fitted with separate air pump there is an ejector fitted to the main condenser capable of producing a vacuum of twenty inches, this vacuum being maintained until the engine has formed an equal vacuum, when the ejector automatically cuts out. This ejector has an independent value apart from the control gear, making the engines much more flexible and easier tocontrol during starting operations.

The Marine Engine Auto Control Co., of 3, Red Cross Street, Liverpool, are placing the apparatus on the market, and will be very pleased to supply any further information or details with regard to the control gear.

MR. GEORGES CARELS read a very interesting paper having reference to the present position of the Diesel engine, chiefly in marine propulsion, before the N.E.C. Institution of Engineers and Shipbuilders recently. The annual dinner of the Institution will be held on January 23rd.

THE 15th annual dinner of the Liverpool Marine Engineers and Naval Architects was held on Dec. 6th at the Exchange Station Hotel, when a large and influential gathering sat down. Mr. Henry W. L. Shubrook has been elected president for the year.

THE WELIN DAVIT AND ENGINEERING CO., LTD., of Lloyd's Avenue, have recently issued a number of publications, all having a direct interest in connection with the safety of life at sea. They are issued, neatly packed in a case and comprise among others, the following titles—"Life-saving at sea," a reprint of a paper read by Mr. Axel Welin before the Royal Society of Arts; "Wire falls for boat handling." "The Welin planet gear, type iv.," which is especially designed for attachment (without removal or alteration) to ordinary round bar davits on vessels already in commission. "The Halley fire extinguishing and fumigating apparatus," etc.

THE LATE SIR WM. WHITE.—PROPOSED MEMORIAL.—The following engineering and allied institutions are supporting the scheme for a memorial to the late Sir Wm. White:—Institution of Civil Engineers, Institution of Mechanical Engineers, Institution of Naval Architects, Iron and Steel Institute, Royal Society of Arts, Institution of Engineers and Shipbuilders in Scotland, North-East Coast Institution of Engineers and Shipbuilders, Institute of Marine Engineers, Institute of Metals. A general committee under the chairmanship of the Right Hon. Earl Brassey, G.C.B., has been formed. The form which the memorial is to take will necessarily depend upon the support which is extended to the scheme, but it is hoped that there will be no difficulty in raising an amount sufficient for the purpose of establishing a memorial worthy of its object. A good start has already been made, £1,368 having been subscribed. All cheques should be crossed "Coutts & Co." and made payable to "The Sir William White Memorial Fund," and sent to Dr. J. H. T. Tudsbery (Honorary Treasurer), Institution of Civil Engineers, Great George Street, Westminster, S.W.

WE regret to report that Mr. Clement Godson, M.D., who served the office of Master of the Shipwrights' Company 1911-1912, died recently after several weeks' illness. He was a distinguished member of the medical profession. His connection with the Shipwrights' Company commenced in 1884.

MARINE MOTOR NOTES.

WHEN looking over the records of the past twelve months, the progress made in the adoption of the oil motor for large vessels has not been great, due to some extent to the scarcity of the fuel supply at what may be considered a reasonable price. Denmark has been well ahead, having an advantage in the route, on which the the vessels fitted with oil motors are employed, being one on which fuel is readily obtained. Messrs. Burmeister & Wain have built several 450 b.h.p. Diesel engines at their Glasgow works, and are also busily engaged in increasing the output with extra time shifts. For auxiliary purposes, oil motors have proved of great advantage, and have given a new lease of life to the wind-jammer, their economy being of much service in reducing harbour towage and the power proving of great value in a dead calm, and it is observed that Messrs. Thornycroft make a feature of a type of motor suitable for such a purpose. The motor coasters trading on the West Coast of Scotland and through the Forth and Clyde canal seem, on the whole, to have come up to expectations. Messrs. Beardmore supplied the motors for three of these coasters of the direct reversible type, a great consideration in view of the manœuvring necessary when making for the piers, harbours and canal locks. This firm has delivered in the course of the year other four sets of oil engines of 80 b.h.p. and over; there are also ready for delivery two sets of 220 b.h.p. and five sets on order of 130 b.h.p. Messrs. Brooke have supplied a large number of motors for small vessels during the past twelve months for home and foreign owners, and the types we have seen commend themselves for the purposes intended. It ought not to be overlooked by those who are interested in canal and inland waterway traffic that much might be done to develop this means of transit by motor-driven boats and barges to suit the accommodation; at the same time, as we have frequently advocated, the canals might be greatly improved and no doubt would be, if encouragement were given by traders. During the railway strike about two to three years ago some traffic was carried on from Birmingham to London, but with the termination of the difficulty, efforts were relaxed.

The recently reported experience of an engineer who took charge of a motor launch and delivered it in the upper reaches of the Amazon, shows the despotic nature of those who control affairs in that region—and the treatment meted out to the natives who labour in the rubber plantations. The opening up of the country which is slowly being accomplished, and the development of the industries, will tend to improve the conditions of servitude by means of a healthy public opinion being exerted, and the number of motor boats and launches being despatched to South America shows that the development is proceeding. With the oilfields of Mexico and the possibilities of distilled vegetable spirit from the vegetation on the river banks, the means of locomotion by land and water are near at hand.

OBITUARY.

David Bell.

IN shipbuilding and marine engineering circles on the Clyde, and throughout the country generally, keen regret was experienced at the announcement of the death on Dec. 11th of Mr. David Bell, Glasgow, formerly a partner in the shipbuilding firm of Messrs. Napier, Shanks and Bell, of Yoker, and for the past fourteen years a confidential member of the staff of the Clyde Shipbuilders' Association. Apart from the distinction due to both of these positions Mr. Bell was well known as one of the best authorities on the history of shipbuilding especially of Clyde shipbuilding—since the inauguration of navigation by steam. Deceased was in his 74th year and on the day previous to death was in attendance, as usual, at the office in Glasgow of the Clyde Shipbuilding Association; and the suddenness of the call deepened the regret at his demise.

Mr. Bell in his youth was confidential draughtsman to Mr. Robert Napier, the famous shipbuilder, and assisted him in preparing estimates for new ships, accompanying him on many important business journeys. After the works of Robert Napier & Sons, Govan, changed hands about 1877, Mr. Bell entered into partnership with Mr. R. T. Napier and Mr. Henry M. Napier, grandsons of Robert Napier, and with Mr. W. Shanks, who had also served with the Napier firm, and established the shipbuilding firm of Napier, Shanks and Bell at Yoker. For upwards of twenty years, under the same co-partnery, much important work was done for well-known shipping companies, and in 1898 the firm was reconstituted, with Mr. Henry M. Napier and Mr. George Millar as sole partners. In 1906 the site of the Yoker yard being required by the Clyde Trust, in the formation of the new Rothesay Dock between Yoker and Clydebank, the firm laid down an entirely new yard at Old Kilpatrick. Following upon the change in co-partnery in 1898, Mr. Bell, as has been indicated, joined the staff of the Clyde Shipbuilders' Association, and ever since has been a confidential and trusted official of the Association.

Throughout his whole life Mr. Bell was closely associated with shipbuilding and marine engineering, and took a keen and thoroughly discriminating interest in the many developments in the industries. He possessed not only a most retentive memory as to events and individuals, but extensive stores of well authenticated records bearing on the design and construction of early steamers, from the *Comet* downwards. He was very frequently consulted by enquirers into the story of early steam navigation, and when the *Comet* centenary celebrations of last year were being organized in Glasgow he was asked to become a member of the committee. He took a special interest in the organization of the centenary exhibition held in the Glasgow Museum and Art Galleries, and in the movements which resulted in the erection in the Glasgow Southern Necropolis of a memorial to John Robertson, the engineer of the *Comet*, and of the monument erected at Robertson's native village of Neilston, Renfrewshire. He collaborated with Mr. David Dehane Napier in the production, last year, of the volume entitled "David Napier, engineer, 1790-1869," supplying an introduction to the short autobiography therein in which he gave the principal facts in the early story of steamship building, and also a number of invaluable notes and much matter relating to the subject of the autobiography.

Mr. R. C. Moffat.

It is with regret we have to announce the death of Mr. R. C. Moffat, consulting engineer and surveyor, of Hull. He was the son of the late Mr. John Moffat, foreman engineer with Jas. Taylor & Co. and Cochran & Co., of Birkenhead. The deceased served an apprenticeship of five years with Messrs. Cochran & Co. and later embarked on his sea-going career, joining the s.s. *Brunswick*, and serving in that vessel and the *Maranham* and *Brazil* for about two years. After securing his second-class certificate he joined the s.s. *Indrapura*, trading in Australian ports. He married the daughter of the late Mr. James Muir, for many years foreman engineer with Messrs. Bailey & Leetham, Hull. After a time as chief in the s.s. *Syria* and s.s. *Oria* he settled in Hull, practising as consulting engineer and surveyor. His death occurred on the 13th December, the funeral being attended by many friends. A widow and adopted daughter are left to mourn his loss.

BOARD OF TRADE EXAMINATIONS.

NOVEMBER 20th, 1913.—LONDON.—*1st Class:* W. Peatling, I. Ward. *2nd Class:* A. Murch, H. Williams.

SOUTHAMPTON.—*2nd Class:* D. Milligan.

WEST HARTLEPOOL.—*1st Class:* J. Arnold, J. Corkery, E. Hackworth, T. Richardson. *2nd Class:* G. Picken, A. Short.

CARDIFF.—*1st Class:* S. Edwards, T. Faulks, S. Kinsman. *2nd Class:* G. Pollard, J. Vickery.

LEITH.—*1st Class:* F. Tyler. *2nd Class:* E. Barker, J. Work.

LIVERPOOL.—*1st Class:* R. Hotham, W. Roberts. *2nd Class:* J. Blue, E. Griffiths, T. Hay, G. Lowrie, J. Murphy, F. Turnbull.

NORTH SHIELDS.—*1st Class:* D. Ferries, J. Nicholson, G. Stephen. *2nd Class:* A. Deacon, D. Durbar, G. Smith.

GLASGOW.—*1st Class:* G. Humphrey, G. Russel, A. Smillie, L. Symes. *2nd Class:* W. Corbett, G. MacKay, A. Watson.

NOVEMBER 27th, 1913.—LONDON.—*1st Class:* W. W. Adamson, G. Elliott, C. Holroyd, S. Legerton, F. Nicholson, J. Trehearn. *2nd Class:* R. Cook, S. Daley, B. Langston, E. Scholey, G. Smith, R. Smith, J. Wood.

LONDONDERRY.—*2nd Class:* J. Morrow.

HULL.—*1st Class:* R. Simms. *2nd Class:* J. Fernhead, A. Perry, R. Raines.

GREENOCK.—*1st Class:* W. Brown, C. Darrock. *2nd Class:* A. Callander, A. Gall, J. Highet, J. Humphrey, J. McGibbon, J. McKay, J. Rankin.

LIVERPOOL.—*1st Class:* W. Bailey, J. Matthews, R. Richards, J. Wilkie. *2nd Class:* A. Barr, J. Bradshaw, J. Hodgson, J. Lee, J. McBirnie, A. Ollerhead.

SUNDERLAND.—*1st Class:* J. Kinmond, A. Mitchell. *2nd Class:* M. Clark, C. Stanbridge.

NORTH SHIELDS.—*1st Class:* H. Young. *2nd Class:* T. Atkinson, A. Francis, A. Heron, T. Johnston, J. Richmond, J. Topping, G. Whitfield.

ABERDEEN.—*1st Class:* D. Baxter. *2nd Class:* H. Taylor.

BRISTOL.—*1st Class:* B. Evans. *2nd Class:* E. Greenwell.

DECEMBER 4th, 1913.—LONDON.—*1st Class:* D. Campbell.

GLASGOW.—*1st Class:* A. Husband, R. Jardine, J. Kerr, C. Macdonald, L. McLachlan, A. Taylor. *2nd Class:* G. Kerr, J. Kerr, T. Maley, W. Milroy, W. Pope, C. Procter, E. Seedhouse, J. Sutherland, D. Thomson.

LEITH.—*2nd Class:* C. Drever, R. Hogan, A. Kirk, A. Peterson.

BELFAST.—*2nd Class:* J. Watts.

LIVERPOOL.—*1st Class:* J. Booth, H. Fentiman. *2nd Class:* W. Morris.

NORTH SHIELDS.—*1st Class:* J. Armstrong, G. Barron, T. Forrest, B. Hodgson, A. Thomas. *2nd Class:* E. Young.

SOUTHAMPTON.—*1st Class:* A. Bullock, T. Weston. *2nd Class:* C. Partridge, T. Read.

CARDIFF.—*1st Class:* W. Crossman, W. Love, F. Smith. *2nd Class:* A. Barnard, G. Clarke, V. Garcia.

DECEMBER 11th, 1913.—LONDON.—*1st Class:* G. Lawrence. C. Sweeting. *2nd Class:* H. Etty, H. Quine, J. Watkins.

DUNDEE.—*2nd Class:* D. Stevens, D. Wood.

GREENOCK.—*1st Class:* J. Alexander, H. Craig. A. Johnstone, J. Kinnon, W. Strachan. *2nd Class:* A. Becket, W. Cook, J. Cummings, A. Jacobs, G. Ramsay, J. Roberts, A. Simpson, D. Walker.

LIVERPOOL.—*1st Class:* G. Fitton, J. Flannagan, D. Mitchell, E. Pellow. *2nd Class:* T. Gemmell, J. Harper, S. Partington.

NORTH SHIELDS.—*1st Class:* F. Scott, T. Smallwood, T. Woolgar. *2nd Class:* C. Campbell, E. Dunn, A. Gedling, J. Robson.

HULL.—*1st Class:* D. Miller, A. Wagg. *2nd Class:* W. Clark, W. Fletcher.

DUBLIN.—*2nd Class:* C. Daniels.

December 18th, 1913.—LONDON.—*1st Class:* P. Billington, D. McGilp.

CARDIFF.—*1st Class:* G. Hall. *2nd Class:* A. Davies, R. Nicholas, D. Rees, T. Wilkinson.

GLASGOW.—*1st Class:* A. Allan, D. Mactaggart, J. Marley, A. Stirrat, W. Sutherland. *2nd Class:* R. Austin, R. Bennett, J. MacDonald, D. Smith.

WEST HARTLEPOOL.—*1st Class:* R. Lamb, W. Stoddart, W. Waugh. *2nd Class:* R. Coverdale, A. Parkes, A. Reynard.

LIVERPOOL.—*1st Class:* J. Boggians. *2nd Class:* R. Harrison, R. Macaulay, H.McDougal, E. Other, H. Palin.

BARROW.—*2nd Class:* J. Montgomery, J. Watters.

LEITH.—*2nd Class:* R. Mason.

NORTH SHIELDS.—*1st Class:* J. Allan, R. Garrick, J. Mole, J. Newbegin, C. Richardson. *2nd Class:* M. Cartledge, J. Emery, W. Hargreaves.

SOUTHAMPTON.—*1st Class:* R. Osmond. *2nd Class:* H. Hodges, A. Read, G. Williams.

UP-KEEP AND MANAGEMENT OF BOILERS ON A TRAMP STEAMER.

At the Institute of Marine Engineers on December 1st, a paper on "The upkeep and management of boilers on a tramp steamer," by Mr. G. A. O'Neill, was read, in the unavoidable absence of the author, by the Hon. Secretary. In dealing with the question of internal corrosion, the author stated that sufficient care was not always taken, when fitting zinc plates in the boiler, to clean away the dirt and scale from around the necks of the stays so as to form a metallic contact. Soda was often used without any consideration as to the amount required. This could easily be ascertained by the use of litmus paper. The pitting frequently found along, and a little above, the line of the firebars on the water side of a furnace, could be arrested by making it a practice to clean thoroughly and remove the black scale, afterwards coating with a mixture of metallic zinc powder and clean fresh water. He did not agree with the practice of scaling furnaces only to the line of the firebars, and leaving the bottoms untouched. In modern ships a great many of the difficulties were eliminated by the use of independent feed pumps and efficient feed heaters.

It was quite a common rule in raising steam to light the fire in the centre low furnace of a three-furnace boiler, four or five hours before the others, but with the modern appliances for artificial circulation this practice was entirely unnecessary. It was also harmful by setting up undue strains on the front end plate. The bottoms of the combustion chamber on the fire side were liable to corrosion if not carefully watched. Salt from leaky tubes and joints, when mixed with wet ashes, set up corrosion, and it was essential that any leaks noticeable should be stopped at the first opportunity. Corrosion at the bottom front end plates could be eliminated to some extent when at sea, if the ashes were removed from the furnace fronts immediately after the fires were cleaned, and not allowed to remain there until the end of the watch as was often the case.

In opening the discussion, Mr. Jas. S. Gander said that with the use of feed heaters, air extractors and filters, it might safely be assumed that the feed water which entered the boilers at sea was fairly clean. In his opinion the damage was done when in port or when proceeding up a fresh water river. Too frequently the water was pumped direct into the boilers instead of into the tanks to settle. Furnace corrosion did not occur when the boilers were fitted for burning oil fuel as the whole circle of the furnace was used as heating surface. External corrosion on the fire side was also absent with oil fuel, as the heating surfaces could be kept much cleaner. Mr. F. M. Timpson considered that in large vessels the system of circulation should be as much as possible automatic. He referred to experiments made with an injection of certain ingredients into the boiler at a temperature of 70 deg. for the purpose of cleaning off the scale, which had been accomplished with success, but he thought such methods would require careful handling. Mr. J. Shanks was of opinion that internal corrosion of boilers, even in tramp steamers, was not very often experienced at the present day. He did not agree with the practice of working the boilers at a density of 5 ozs. in order to get a protective scale; he considered that the best results were obtained by preventing scale from forming. It was important that efficient circulation should be maintained in the boiler while raising steam. He believed in the use of automatic systems for circulating the water if precaution were taken against the possibility of accidents.

The Chairman remarked that there was an element of danger in the use of fluid scales in that they might be too searching in cleaning away material which got into the seams and helped to keep the boilers tight. It might also have the effect of loosening scale which might afterwards fall and lodge upon the furnace crowns. Referring to the value of the feed heater, he pointed out that for every 10 deg. increase in feed temperature there was a saving of 1 per cent. in coal.

Mr. D. Hulme described a method of dealing with pitting which he had found useful, and Messrs. G. U. Morgan, B. P. Fielden and Jas. Adamson (Hon. Secretary) also spoke.

Summary of Shipbuilding Returns of United Kingdom, arranged in order of Tonnage built by each firm.

Name of Firm.	Place.	No. of Vessels.	Total 1913.	Tons.* 1912
Swan, Hunter & Wigham Richardson, Ltd.	Tyne	—	107,636	126,152
Sir W. G. Armstrong, Whitworth & Co., Ltd.	Tyne	9	99,333	41,535
Wm. Gray & Co., Ltd.	Tees	18	97,100	90,272
Workman, Clark & Co., Ltd.	Belfast	11	84,217	85,391
Russell & Co., Ltd.	Clyde	16	83,876	71,224
John Brown & Co., Ltd.	Clyde	5	82,722	22,782
Irvine's Shipbuilding & Dry Dock Co., Ltd.	Tees & H.	15	81,160	52,410
Harland & Wolff, Ltd.	Belfast	8	71,292	77,591
	Clyde	—	—	12,210
Vickers, Ltd.	Barrow	9	64,700	52,860
Wm. Doxford & Son, Ltd.	Wear	9	63,854	92,482
Northumberland Shipbuilding Co., Ltd.	Tyne	12	63,400	62,130
Palmer's Shipbuilding & Iron Co., Ltd.	Tyne	10	53,066	58,902
J. L. Thompson & Sons, Ltd.	Wear	9	52,094	37,749
Ropner & Sons, Ltd.	Tees	10	50,584	49,126
Alex. Stephen & Sons, Ltd.	Clyde	5	47,714	29,611
Barclay, Curle & Co., Ltd.	Clyde	6	45,299	43,412
Scott's Shipbuilding & Engineering Co., Ltd.	Clyde	5	45,015	58,314
Richardson, Duck & Co., Ltd.	Tees	8	42,533	39,388
Wm. Beardmore & Co., Ltd.	Clyde	3	44,435	21,500
Wm. Denny & Bros.	Clyde	9	40,803	33,925
John Readhead & Sons, Ltd.	Tyne	8	38,318	30,487
Cammell, Laird & Co., Ltd.	Mersey	7	38,000	77,032
R. & W. Hawthorn, Leslie & Co., Ltd.	Tyne	6	37,171	37,460
Earle's Shipbuilding & Engineering Co., Ltd.	Humber	9	36,125	26,189
Caird & Co., Ltd.	Clyde	4	35,980	35,936
Sir Raylton Dixon & Co., Ltd.	Tees & H.	8	35,700	23,467
Wm. Hamilton & Co., Ltd.	Clyde	7	35,180	40,029
Craig, Taylor & Co., Ltd.	Tees & H.	6	34,451	30,817
Short Bros., Ltd.	Wear	6	33,216	32,731
Fairfield Shipbuilding & Engineering Co., Ltd.	Clyde	6	33,200	36,626
Chas. Connell & Co., Ltd.	Clyde	6	32,720	45,314
Greenock & Grangemouth Dockyard Co.	Clyde & Forth	10	32,212	23,586
D. & W. Henderson, Ltd.	Clyde	5	29,446	27,768
Sir James Laing & Sons, Ltd.	Wear	5	28,244	23,538
Bartram & Sons, Ltd.	Wear	3	26,895	22,856
John Priestman & Co., Ltd.	Wear	6	25,703	22,330
Wm. Pickersgill & Sons, Ltd.	Wear	5	25,101	13,783
John Blumer & Co.	Wear	7	25,065	15,973
Sunderland Shipbuilding Co., Ltd.	Wear	5	22,729	24,078
Robt. Thompson & Sons, Ltd.	Wear	5	20,877	19,221
Napier & Miller, Ltd.	Clyde	5	18,702	15,161
Tyne Iron Shipbuilding Co., Ltd.	Tyne	4	17,141	12,537
A. McMillan & Sons, Ltd.	Clyde	3	15,580	26,141
Blyth Shipbuilding & Dry Dock Co., Ltd.	Tyne	6	14,879	12,215
Caledon Shipbuilding Co., Ltd.	Tay	3	13,427	12,133
Wm. Dobson & Co.	Tyne	4	13,064	12,230
Osbourne, Graham & Co.	Wear	8	12,744	11,408
Clyde Shipbuilding & Engineering Co., Ltd.	Clyde	8	12,679	8,831
Smith Docks Co., Ltd.	Tees	26	12,037	10,029
S. P. Austin & Son, Ltd.	Wear	5	11,667	8,420
Fleming & Ferguson	Clyde	12	11,500	9,300
Wm. Simons & Co., Ltd.	Clyde	15	11,080	7,643
Dunlop, Bremner & Co., Ltd.	Clyde	5	10,500	7,025
Robt. Duncan & Co., Ltd.	Clyde	2	10,251	15,059
Ailsa Shipbuilding Co., Ltd.	Clyde	5	10 155	14,035
Cochrane & Sons, Ltd.	Humber	39	9,986	8,242
Cook, Welton & Gemmell, Ltd.	Humber	34	8,459	7,011
Lobnitz & Co.	Clyde	23	8,458	7,100
Wood, Skinner & Co., Ltd.	Tyne	6	8,135	10,945
Yarrow & Co., Ltd.	Clyde	10	7,453	3,319
John Crown & Sons, Ltd.	Wear	4	7,438	4,267
Goole Shipbuilding Co. and associated firm, Dundee Shipbuilding Co.	Humber	12	6,947	8,111
A. & J. Inglis, Ltd.	Clyde	4	6,604	1,333
Wm. Harkess & Sons, Ltd.	Tees & H.	4	6,161	6,630
Hall, Russell & Co., Ltd.	Dee	18	5,892	5,196
John I. Thornycroft & Co., Ltd.	English Ch.	—	5,220	3,100
Rennie Forrestt Shipbuilding & Dry Dock Co., Ltd.	Thames	28	5,205	6,104
Mackay Bros.	Forth	2	5,062	5,331
Ferguson Bros.	Clyde	4	5,000	2,980
A. W. Robertson & Co.	Thames	30	4,990	4,233
Bow, McLachlan & Co., Ltd.	Clyde	13	4,864	3,039
J. Saml. White & Co., Ltd.	English Ch.	—	4,838	4,476
Campbeltown Shipbuilding Co., Ltd.	Clyde	2	4,819	8,554
Geo. Brown & Co.	Clyde	7	4,145	1,010
Murdoch & Murray, Ltd.	Clyde	5	3,816	2,521
John Duthie Torry Shipbuilding Co.	Dee	14	3,471	2,609
C. H. Walker & Co., Ltd.	Bris. Ch.	11	3,280	2,131
Alley & MacLellan	Clyde	19	2,909	2,750
John Fullerton & Co.	Clyde	5	2,763	2,121
Scott & Sons	Clyde	8	2,519	2,600
W. J. Yarwood & Sons	Mersey	—	2,405	1,819
Isaac J. Abdela & Mitchell, Ltd.	Mersey	—	2,400	1,340
J. T. Eltringham & Co., Ltd.	Tyne	8	2,398	1,029
Ramage & Ferguson	Forth	3	2,387	5,202
Alex. Hall & Co.	Dee	10	2,195	1,803
John Chambers, Ltd.	Thames	27	2,155	1,669
Lytham Shipbuilding Co.	Ribble	23	1,850	2,198
J. P. Rennoldson & Sons	Tyne	6	1,614	2 230
Edwards & Co.	Thames	24	1,598	1,361
Dublin Dockyard Co., Ltd.	Dublin	5	1,480	1,641
R. Williamson & Son	Mersey	2	1,414	2,823
Wm. Chalmers & Co.	Clyde	5	1,281	—
Hawthorns & Co., Ltd.	Forth	5	1,119	1,810
W. H. Warren	Humber	7	1 000	1 205
Ritchie, Graham & Milne	Clyde	7	870	315
Crabtree & Co.	Thames	9	823	1,062
John Cran & Co.	Forth	6	675	369
Beeching & Co.	Thames	7	659	800
Hepple & Co. Ltd.	Tyne	5	550	758
Isaac Pimblott & Son, Ltd.	Mersey	31	529	686
Henry Scarr, Ltd.	Humber	11	470	920
Philip & Sons	English Ch.	—	469	460
Fellows & Co.	Thames	7	428	550
Simpson, Strickland & Co., Ltd.	English Ch.	—	385	252
Maryport Shipbuilding & Repairing Co., Ltd.	Mersey	1	293	—
Cox & Co. (Engineers), Ltd.	English Ch.	5	249	305
Larne Shipbuilding Co., Ltd.	Ireland	2	180	125
A. Robertson & Co., Ltd.	Clyde	1	110	—

* Includes displacement tonnages and erections.

MARINE ENGINEERING OUTPUT.

Name of Firm.	Place.	Total 1913.	I.H.P. 1912.
John Brown & Co., Ltd.	Clyde	239,000	178,500
Fairfield Shipbuilding & Engineering Co.	Clyde	201,000	55,200
Wallsend S. & E. Co., Ltd.	Tyne & W.	159,550	123,000
R. & W. Hawthorn, Leslie & Co.	Tyne & W.	138,650	82,850
Vickers, Ltd.	Barrow	121,000	136,750
John I. Thornycroft & Co.	Engl. Ch.	110,300	38,350
Cammell, Laird & Co., Ltd.	Mersey	90,100	101,350
North-Eastern Marine Engineering Co.	Tyne & W.	89,605	129,125
Parsons' Marine Steam Turbine Co., Ltd. (Mechanical gearing 75,400)	Tyne & W.	87,000	96,800
Yarrow & Co.	Clyde	86,580	46,125
Denny & Co.	Clyde	82 600	58 400
Richardsons, Westgarth & Co., laad department, in addition, 53,600	Tees	81,500	67,000
J. Saml. White & Co.	Engl. Ch.	77,601	56,476
William Beardmore & Co.	Clyde	75,475	60,000
Blair & Co.	Tees	73,700	76,850
Workman, Clark & Co.	Belfast	60,200	53,400
David Rowan & Co.	Clyde	56,470	52,700
Central Marine Engineering Works	Hartlepool	56,415	46,510
Harland & Wolff, Ltd.	Belfast	53,390	39,300
John Dickinson & Sons	Tyne & W.	51,360	39,940
Geo. Clark	Tyne & W.	42,150	35,800
Alex. Stephen & Sons	Clyde	38,350	31,920
Rankine & Blackmore	Clyde	35,870	25,000
Kincaird & Co.	Clyde	33,100	27,750
Barclay, Curle & Co.	Clyde	30,200	33,850
Swan, Hunter & Wigham Richardson	Tyne & W.	28,300	26,000
Earle's Shipbuilding & Engineering Co.	Humber	27,980	34,260
Scott's Shipbuilding & Engineering Co.	Clyde	27,000	51,500
Caird & Co.	Clyde	27,000	27,000
Wm. Doxford & Sons	Tyne & W.	25,700	35,500
Palmers' Shipbuilding & Iron Co.	Tyne & W.	25,100	19,130
Dunsmuir & Jackson	Clyde	21,000	41,650
Charles D. Holmes & Co.	Humber	20,286	16,730
John Readhead & Sons	Tyne & W.	18,800	14,300
D. & W. Henderson	Clyde	18,100	14,255
Clyde Shipbuilding & Engineering Co.	Clyde	17,100	11,100
Ross & Duncan	Clyde	15,250	15,420
Wm. Simons & Co.	Clyde	14,340	12,080
Fleming & Ferguson	Clyde	13,800	12,200
Smith's Dock Co., Ltd.	Tees, etc.	13,250	12,000
Amos & Smith	Humber	12,271	11,020
Bow, McLachlan & Co.	Tees, etc.	12,100	11,440
A. & J. Inglis	Clyde	11,000	4,100
Hall, Russell & Co.	Dee	10,010	8,925
MacColl & Pollock	Tyne & W.	9,630	11,440
Lobnitz & Co.	Clyde	9,532	12,100
McKie & Baxter	Clyde	8,790	9,115
Shields Engineering & Dry Dock Co.	Tyne & W.	8,500	10,290
Ferguson Bros.	Clyde	8,160	5,320
Ailsa Shipbuilding Co.	Clyde	7,700	13,150
Dunlop, Bremner & Co.	Clyde	7,400	3,250
Plenty & Sons, 5,350 ; Do., Kromhout Eng.,	1,990 Thames	7,340	5,150
W. V. V. Lidgerwood	C'bridge	6,760	6,860
G. T. Grey	Tyne & W.	6,165	7,730
Crahtree & Co.	Thames	4,890	5,105
J. P. Rennoldson & Sons	Tyne & W.	4,687	3.806
Alex. Hall & Co.	Dee	4,310	3,900
Elliott & Garrood	Beccles	4,070	2,760
Abernethy & Co.	Dee	3,955	2,040
Aitchison, Blair & Co.	Clyde	3,870	3,850
Cooper & Greig	Dundee	3,500	1,000
Campbell & Calderwood	Clyde	2,850	3,550
Caledon Shipbuilding Co.	Tay	2,725	9,400
Ramage & Ferguson	Forth	2,650	6,250
Hawthorns & Co.	Forth	2,550	1,235
John Cran & Co.	Forth	2,480	250
James Ritchie	Clyde	2,300	1,950
T. & J. Hosking	Thames	2,120	2,170
Vauxhall & W. H. E. Co.	Luton	2,050	1,675
Muir & Houston	Clyde	2,000	9,930
Hepple & Co.	Tyne & W.	1,900	1,550
Lytham Shipbuilding Co.	Ribble	1,640	3,480
Simpson, Strickland & Co.	Engl. Ch.	1,596	1,968
W. J. Yarwood & Sons	Mersey	1,531	945
Gt. Central Co-op. Co.	Humber	1,260	840
Gauldie, Gillespie & Co.	Clyde	1,180	2,660
Philip & Sons	Engl. Ch.	878	1,550
Fishers, Ltd.	Clyde	860	1,030
Cox & Co.	Engl. Ch.	860	1,136
Isaac J. Abdela, Mitchell & Co.	Mersey	757	600
McColl & Co., Ltd.	Belfast	750	750
Menzies & Co.	Forth	175	180
John Chambers	Thames	155	—

* Includes displacement tonnages and erections.

List of Vessels Launched and Engined in 1913.

THE TYNE.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Elswick.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Rio de Janeiro ..	Steel	Foreign	—	27,500	94,000
Almirante Latorre	,,	,,	—	28,000	
H.M.S. Birmingham	,,	British	—	5,450	
Kim, scr.	,,	Foreign	—	5,858	2,940
C.A. Canfield, scr.	,,	British	—	6,350	2,750
San Isidoro, scr.	,,	,,	—	10,074	4,700
San Ricardo, scr.	,,	,,	—	6,465	3,100
San Urbano, scr.	,,	,,	—	6,458	3,100
Charles E. Harwood, scr. ..	,,	,,	—	3,178	1,000
				Total	111,590

Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.

† Ridley, scr. str.	Steel	British	—	3,323	1,790
† Dilston scr. str.	,,	,,	—	1,530	1,345
† Ryton, scr. str.	,,	,,	—	3,991	2,140
† Borgland, scr. str.	,,	Norwegian	—	2,991	1,750
† Bywell, scr. str.	,,	British	—	1,522	1,345
† Elsdon, scr. str.	,,	,,	—	1,522	1,345
				Total	9,715

Wm. Dobson & Co., Newcastle-on-Tyne.

Luz Blanca, single-scr. oil tanker	Steel	—	4,868	5,120	2,700
Corvin, single-scr. pass. str.	,,	—	1,444	1,510	1,270
Mitcham, twin-scr. collier..	,,	—	1,125	1,145	1,260
Cargo steamer, single-scr...		—	4,652	5,289	2,600
				Total	7,830

Jos. T. Eltringham & Co., South Shields.

Flying Kestrel, scr.	—	British	—	516	1,100
St. Agnes No. 1, scr. ..	—	,,	—	210	450
R. Irvin, scr.	—	,,	—	208	450
Loyal Prince, scr.	—	,,	—	208	450
Margaret Ham, scr.	—	,,	—	113	500
Flying Breeze, scr.	—	,,	—	387	900
Normandie, scr.	—	French	—	548	720
Northern Prince, scr... ..	—	British	—	208	450
				Total	5,020

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne.

t H.M.S. Contest, scr.	—	British	—	dis.1,071	—
Lycaon, single scr.	—	,,	—	7,705	—
Malmberget, single scr. ..	—	Foreign	—	7,948	—
Desahla and Barneson, single scr.	—	British	—	6,371ea	—
Troilns, single scr.	—	,,	—	7,705	—

H.M.S. Contest, the Malmberget, Desabla and Barneson have been engined and boilered by Messrs. R. & W. Hawthorn, Leslie & Co. at their St. Peter's Works (see also Engine Section). The machinery and boilers of the s.s. Lycaon and Troilns have been constructed by The North-Eastern Marine Engineering Co., Ltd.

Hepple & Co., Ltd., South Shields.

‡‡Croft, tw.-scr. tug	Steel	British	68	150	900
† Conqueress, scr. tug	,,	,,	—	120	500
sl Eppleton, tw. paddle tug..	,,	,,	15	150	500
2 Barges	,,	,,	60ea	65ea	—
				Total	1,900

Engines by same Company.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

Buenaventura	—	British	—	5,600	3,180
Victorian Transport	—	,,	—	5,100	2,150
Tasmanian Transport ..	—	,,	—	5,100	2,150
African Transport	—	,,	—	5,100	2,150
Midland	—	,,	—	4,900	2,000
Frimley	—	,,	—	5,500	2,500
Holtye	—	,,	—	5,900	2,550
Pacific Transport	—	,,	—	5,100	2,150
New Zealand Transport ..	—	,,	—	5,100	2,150
Mendip Range	—	,,	—	5,100	2,150
Tirreno	—	Austrian	—	5,900	2,400
Magdala	—	Swedish	—	5,000	2,000
				Total	27,530

WORK ON HAND—

1 vessel for Hamburg-American Co.	—	—	— ab. 9,000dw.	—
1 vessel for East Asiatic Co.	—	—	— ab. 7,000dw.	—
Single-deck vessel for Fred. Drnghorn, Ltd.	—	—	— ab. 7,500dw.	—
Shelter-deck vessel for Thos. Wilson, Sons & Co. ..	—	—	— ab. 9,000dw.	—
2 vessels booked for Furness, Withy & Co.	—	—	ea. ab.10,000dw.	—

‡‡ Compound Surface Condensing † Triple. *t* Turbine. *sl* Side Lever.

Palmers' Shipbuilding & Iron Co., Ltd., Hebburn and Jarrow-on-Tyne.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
La Negra, meat and pass.	Steel	British	—	8,312	5,900
Kafue, cargo	,,	,,	—	6,044	3,300
Karroo, cargo	,,	,,	—	6,127	3,300
Osage, oil	,,	Foreign	—	5,051	1,600
Pawnee, oil	,,	,,	—	4,972	1,600
San Hilario, oil	,,	British	—	10,157	4,100
San Valerio, oil	,,	,,	—	6,433	3,000
Leonidas, destroyer	,,	,,	—	1,127dis.	—
Lucifer, destroyer	,,	,,	—	1,127dis.	—
Donax, oil	,,	,,	—	3,716	2,300
				Total	25,100

John Readhead & Sons, Ltd., South Shields.

Trevethoe	—	British	—	5,101	2,300
Trevilley	—	,,	—	5,111	2,300
Trevider	—	,,	—	5,113	2,300
Tregarthen	—	,,	—	5,117	2,300
Westville	—	,,	—	3,539	1,800
Savan	—	,,	—	4,993	2,800
Bronwen	—	,,	—	4,672	2,500
Onwen	—	,,	—	4,672	2,500
				Total	18,800

Machinery and boilers by same Company.

A considerable amount of repair work has also been done in the Graving Dock Department.

Chas. Rennoldson & Co., The Lawe Shipyard, South Shields.

New Yard. Last five months has been employed in laying out the yard and getting plant into position.

WORK ON HAND—

2 vessels for the Mersey Docks and Harbour Board.

1 coasting vessel for Liverpool Owners.

J. P. Rennoldson & Sons, South Shields.

Sir Hugh Bell, paddle ..	Steel	British	—	175	600
Abeille XI., tw.-scr.	,,	French	—	257	1,050
Lady Brassey, tw.-scr. ..	,,	British	—	362	1,620
Quaysider, scr.	,,	,,	—	594	725
C. J. Archer, scr.	,,	,,	—	64	182
Abeille 3, scr.	,,	French	—	160	510
				Total	4,687

Swan, Hunter & Wigham Richardson, Ltd., Wallsend and Walker-on-Tyne.

British merchant ships, including 11 for carrying oil in bulk	—	—	—	98,807	50,550
British Adm. work	—	—	—	3,840	49,000
Colonial ships	—	—	—	3,669	6,600
Foreign ship	—	—	—	1,320	3,300

Engines built at Swan, Hunter & Wigham Richardson's Neptune Engine Works, and included in the above-mentioned I.H.P., 28,300.

One merchant vessel, the motor-ship Arum, is fitted with twin-screw "Neptune-Diesel" engines.

Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne.

† Roumanian Prince, oil tanker	Steel	British	4,147	..	2,050
† Hannah, scr.	,,	,,	3,697	—	2,100
† Silvia, scr.	,,	,,	5,267	—	3,080
† Ruel, scr.	,,	,,	4,029	—	2,130
				Total	9,360

Wood, Skinner & Co., Ltd., Bill Quay, Newcastle-on-Tyne.

† Michael Whitaker, steam scr.	Steel	British	1,018	1,700	1,100
† Salamanca, steam screw ..	,,	Norwegian	728	1,317	1,270
† Sevilla, steam scr.	,,	,,	730	1,318	1,270
† Ascain, steam scr.	,,	French	1,044	1,738	1,240
† Petridge, steam scr.	,,	British	1,052	1,711	900
† Dredger No. 2, steam scr. ..	,,	,,	136	349	400

WORK ON HAND—

All the berths in the yard are fully occupied, the orders in hand comprising vessels for the general cargo and coal trades as well as of special type for the fruit trade. One of the largest vessels on the stocks, about 425 feet in length, is in an advanced stage of construction, and will be launched in the early part of next year.

THE WEAR.

William Doxford & Sons, Ltd., Sunderland.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Nordmark, steamer	Steel	German	—	5,079	3,000
Harlow, steamer	,,	British	—	6,550	3,800
Hermion, steamer	,,	Norweg.	—	4,354	2,000
Hesperos, steamer	,,	,,	—	4,354	2,000
Südmark, steamer	,,	German	—	5,153	3,000
Gifford, steamer	,,	British	—	5,118	3,000
Pontoporos, steamer	,,	Grecian	—	4,048	1,800
Tuscan Prince, steamer ..	,,	British	—	5,274	3,000
San Jeronimo, steamer ..	,,	,,	—	10,150	4,100
Actual gross register, including measured spaces and cylindrical tanks ..				63,854	

† Triple.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Queensland Transport	—	British	—	5,560	2,150
Oosterdyk shel. dk.	—	Foreign	—	9,000	5,000
Zeta	—	,,	—	3,600	1,550
Westerdyk, shel. dk.	—	,,	—	9,000	5,000
Garron Head	—	British	—	2,350	1,050
Ocean Transport	—	,,	—	5,560	2,150
Eustace, shel. dk.	—	,,	—	5,450	2,650
Manchester Civilian	—	,,	—	5,600	2,150
Tanis, shel. dk.	—	,,	—	5,000	1,850
Oldfield Grange	—	,,	—	5,560	2,150
Orlock Head	—	,,	—	2,350	1,050
Imperial Transport	—	,,	—	5,560	2,150
Stanley	—	,,	—	5 450	2,650
Royal Transport	—	,,	—	5,560	2,150
Egyptian Transport	—	,,	—	5,560	2,150

S. P. Austin & Son, Ltd., Sunderland.

Corton, scr. steamer	Steel	British	—	3,405	1,825
Portwood, scr. steamer	,,	,,	—	2,140	1,325
Moto, scr. steamer	,,	,,	—	1,941	1,325
Hitchin, scr. steamer	,,	,,	—	1,933	1,325
Bestwood, scr. steamer	,,	,,	—	2,248	1,325

Bartram & Sons, Ltd., Sunderland.

Harflete, steamer	Steel	British	—	5,247	2,410
Radnorshire, steamer	,,	,,	—	5 445	2,410
Merionethshire, steamer	,,	,,	—	5,477	2,410
Glenearn, steamer	,,	,,	—	5,247	2,410
Etonian, steamer	,,	,,	—	5,477	2,410

John Blumer & Co., Sunderland.

Tynehome	Steel	British	—	3,579	1,820
Dingle Bank	,,	,,	—	3,558	1,820
Fairhaven	,,	,,	—	3,553	1,800
Georgios	,,	Greek	—	3,584	1,820
Nevisbrook	,,	British	—	3,595	1,700
Jedmoor	,,	,,	—	3,598	1,750
Kelsomoor	,,	,,	—	3.598	1,750

John Crown & Sons, Ltd., Sunderland.

Sharon, scr. steamer	—	British	—	2,277	222
Vectis, scr. steamer	—	,,	—	1,152	148
Slav. scr. steamer	—	,,	—	2,274	222
Cedartree, scr. steamer	—	,,	—	1,733	197

Sir James Laing & Sons, Ltd., Sunderland.

Clan Macbeth	—	British	—	5,047	2,000
Novgorod	—	Foreign	—	5,378	2 400
Lucellum, oil carrier	—	British	—	5,330	2,400
Shabonee. oil carrier	—	,,	—	5,313	2,400
San Joaquin, oil carrier	—	Foreign	—	7,176	2,900

Osbourne, Graham & Co., Sunderland.

Durley Chine, steam	Steel	British	2 106	—	1,254
Joachim Brinch Lund, Monitor design, steam	,,	Foreign	—	1,694	1,020
Renteria, do.	,,	,,	—	2,089	1,008
Charles le Borgne, steam	,,	,,	—	1,031	1,000
Honoreva, arch design, stm.	,,	British	—	1,472	820
Figulina, steam	,,	Foreign	—	1,081	780
Jeannine, steam	,,	,,	—	1,081	780
Wingate, Monitor design, stm.	,,	British	—	2,190	1,185

John Priestman & Co., Ltd., Sunderland.

† Africanic, single deck	Steel	Foreign	—	4,200	1,915
† Tátra, single deck	,,	,,	—	5,267	2,000
† Ecaterini Natsouki, do.	,,	British	—	3,925	1,800
† Satrap, R.Q. deck	,,	,,	—	2,310	1,350
† Wentworth shelter deck,	,,	,,	—	4,972	1,950
† Constantinos XII., single deck	,,	Foreign	—	5,029	2,300

Wm. Pickersgill & Sons, Ltd., Sunderland.

Benheather	—	British	—	5,208	1,900
Photinia	—	,,	—	5,400	2,200
Helmsloch	—	,,	—	4,918	1,850
Newlyn	—	,,	—	4,724	1,850
Polyktor	—	Greek	—	4,850	1,850

Short Brothers, Ltd., Sunderland.

Ellin	—	Foreign	—	5,719	2,320
Florazan	—	British	—	5,162	2,250
Floridian	—	,,	—	5,238	2,250
Anglo-Brazilian	—	,,	—	7,871	3,640
Vasilefs Constantinos	—	Foreign	—	5,108	2,120
Kurdistan	—	British	—	4,115	1,900

Sunderland Shipbuilding Co., Ltd., Sunderland.

Tiara	Steel	British	—	4,372	2,045
Shirley	,,		—	6,081	3,030
W. H. Dwyer	,,	,,	—	2,020	1,020
Harbury	,,	,,	—	5,740	2,650
No. 280 s.s.	,,	,,	—	4,514	2,060

† Triple.

Joseph L. Thompson & Sons, Ltd., Sunderland.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Ariadne Irene	Steel	British	—	5,287	2,300
Harewood	,,	,,	—	4,823	2,100
North Pacific	,,	,,	—	5,451	2,400
Kiruna	,,	Swedish	—	6,169	2,760
Swanmore	,,	British	—	6,897	3,750
Den of Ewnie	,,	,,	—	6,185	2,730
Mottisfont	,,	,,	—	6,303	2,730
South Pacific	,,	,,	—	4,676	2.240
Batsford	,,	,,	—	6,303	2,730

Robert Thompson & Sons, Ltd., Sunderland.

**Iossifoglu, screw	Steel	Greek	—	4,408	1,985
**Evangelos, screw	,,	,,	—	4,799	2,190
**Ellerdale, screw	,,	British	—	4,180	2,040
**Bertrand, screw	,,	,,	—	4,439	2,050
**Keltier, screw	,,	Belgian	—	3,051	1,395

TEES & HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Stockton-on-Tees.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Clarissa Radcliffe, sing. dk.	—	British	—	6,912	2,850
a Winamac, oil tanker	—	,,	—	5,989	3,000
† Atherstone, single deck	—	,,	—	5,090	2,250
† Absirtea, single deck	—	Austrian	—	5,090	2,165
† Penistone, single deck	—	British	—	5,090	2,250
† Headley, shel. deck	—	,,	—	6,280	2,750

Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees.

Edlington, steam	Steel	British	—	4,920	2,000
Wagama, steam	,,	Foreign	—	5,450	2,250
Wascana, steam	,,	,,	—	5,450	2,250
Valegarth, steam	,,	British	—	1,600	1,100
Winterton, steam	,,	,,	—	4,920	2,000
Tascalusa, steam	,,	,,	—	6,700	3,150
Wolverton. steam	,,	,,	—	4,920	2,000
Northern Coast, steam	,,	,,	—	1 740	1,100

In addition to building above a large amount of repairing work has bee dooe.

W. Gray & Co., Ltd., West Hartlepool.

Noorderdyk	—	Foreign	—	7,364	3,980
St. Chamond	—	,,	—	3,161	1,430
Ozarda	—	British	—	5,337	4,125
City of Norwich	—	,,	—	7.656	4,030
Pensilva	—	,,	—	4,782	2,040
Kathlamba	—	,,	—	7,656	3,820
Nominoe	—	,,	—	3,310	1,590
Arahistan	—	,,	—	5,780	3,980
Penhallow	—	,,	—	4,782	2,040
Dunsley	—	,,	—	6,380	2,820
Orna	—	,,	—	5,337	3,980
Muristan	—	,,	—	3,310	1,590
Oceanos	—	,,	—	6,253	2,450
Penmorvah	—	,,	—	4,782	2,040
Hackness	—	,,	—	6,380	2,820
Nigaristan	—	,,	—	4,800	2,040
Banka	—	Foreign	—	6,720	4,570
838	—	—	—	3,310	1,590

Wm. Harkess & Sons, Ltd., Middlesbrough.

† Caodelaria, cstg. trade	Steel	Brazilian	448	896	765
† Mardinian, Medn. trader	,,	British	2,125	3,321	1,750
† Hopeful coaster	,,	,,	487	1,165	1,050
† Suffolk Coast, cstg. trade	,,	,,	377	779	750

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

Dartwen, steamer	—	British	—	5,346	2,300
Burcombe, steamer	—	,,	—	4,464	1,950
Purley, Isherwood steamer	—	,,	—	5,848	2,450
Dromore, Isherwood steamer	—	,,	—	4,923	2,600
Caldy, steamer	—	,,	—	5,348	2,350
Daleham, steamer	—	,,	—	6,257	3,000
Burdale, steamer	—	,,	—	5,360	2,250
Sicily, Isherwood steamer	—	,,	—	4,987	2,400

Ropner & Sons, Ltd., Stockton-on-Tees.

† Somersby	Steel	British	—	4,023	1,950
† Devon City	,,	,,	—	5,470	2,400
† Wearpool	,,	,,	—	5,898	2,700
† Scythian	,,	,,	—	5,275	2,400
† Baldersby	,,	,,	—	4,351	1,950
† Eastern City	,,	,,	—	5,495	2,400
† Seapool	,,	,,	—	5,437	2,300
† Falls City	,,	,,	—	5,283	2,400
† Saxilby	,,	,,	—	4,410	1,950
† Lord Tredegar	,,	,,	—	4,942	2,400

Smith's Dock Co., Ltd., Middlesbrough.

26 scr. vessels	Steel	—	total	12,037	—

HUMBER.

Cook, Welton & Gemmell, Ltd., Beverley.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† 34 Steam trawlers	Steel except one	British	—	8,459	15,380

** Tri-Compound. *a* Quadruple. † Triple.

The Goole Shipbuilding and Repairing Co., Ltd., and Associated Firm, The Dundee Shipbuilding Co., Ltd.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Dernes, screw steamer ..	Steel	Foreign	—	726	700
Transmitter, cable str. ..	,,	British	—	903	750
Killdeer and Trumpeter, s.s	,,	,,	—	192ea	300ea
Las Heras and Liniers ..	,,	Argentine	—	132ea	550ea
Tees Trader	,,	British	—	701	900
Llanelly Trader	,,	,,	—	702	900
Silvio	,,	,,	—	1,284	970
Sif	,,	Foreign	—	1,293	900
Dalgarth Force	,,	British	—	620	500
Flip (large)	,,	,,	—	70	—

WORK ON HAND—
Salvage vessel for the Admiralty; large twin-screw crane barge and various steamers.

Richard Dunston, Thorne, Doncaster.

Kathleen, Canal barge ..	Oak	—	—	120	—

WORK ON HAND—

2 Canal barges	Oak	—	—	120	—

Routh & Waddington, Doncaster.

Amity, Sailing	Wood	—	—	130	—

Henry Scarr, Ltd., Hessle, nr. Hull.

Shag, Ringplover, Ringparrot and Ringthrush, 4 towing barges	Steel	English	123ea	126ea	—
7 Tugs, barges, etc.	,,	,,	251	344	565

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

Gitano	—	British	—	1,730	1,300
Federiko Glavic	—	Foreign	—	6,075	2,400
Polo	—	British	—	2,970	1,350
Teano	—	,,	—	2,970	1,350
Maroniau	—	,,	—	3,390	1,700
Sagoland	—	Swedish	—	6,795	2,600
New Sweden	—	,,	—	6,805	2,600
Malatian	—	British	—	1,890	1,700
Pangbourne	—	,,	—	3,500	900
					15,900
Machinery for renewals and ships built elsewhere					12,080
				Output I.H.P.	27,980

W. H. Warren, Hull.

Charity, lighter	Steel	British	220	—	—
m Co-operator, lighter	,,	,,	110	—	—
2 Grab dredgers	,,	Foreign	125	—	—
2 Hopper barges	,,	British	160ea	—	—
Lighter	,,	,,	225	—	—

THAMES.

Beeching Bros., Ltd., Great Yarmouth.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
7 Steam fishing vessels ..	Wood	British	224	659	1,425

Crabtree & Co., Great Yarmouth.

Verity, Steam drifter	Steel	British	—	102	240
20 other vessels, stm. drifters, etc. (engines only for 10 of above)	Steel and Wood	Brit. & For.	—	823	4,650

WORK ON HAND—

5 Vessels	—	—	—	ab500	—
12 Sets of engines	—	—	—	—	2,560

Engines by same Company.

Edwards & Co., Ltd., Millwall.

24 vessels, including floating crane, stern wheeler, pontoons, barges & lighters ..	Steel	Brit. & For.	1,598	—	—

Edward Hayes, Esq., Stony Stratford.

‡‡5 vessels, single screw, steam tugs and launch	Steel	—	—	122	360

WORK ON HAND—

3 Vessels	Steel	—	—	—	—

‡‡Several sets of engines and boilers.
Engines by same firm.

A. W. Robertson & Co., Canning Town, E.

6 Lighters, sailing	Steel	Foreign	—	1,500	—
23 River lighters	,,	British	—	3,470	—
1 Electric haulage barge ..	,,	,,	—	20	—

Salter Bros., Oxford.

† Wargrave, river pass. st. ..	Steel	British	29	45	65
‡‡Royalty, river pass. st. ..	,,	,,	50	70	120
Composite launch for Rangoon, towing launch ..	,,		not regd.		—

Rowhedge Iron Works, Ltd., Rowhedge, Colchester.

20 Launches, tugs, etc. ..	Wood & Steel	—	—	270	1,357
9 Sets of engines	—	—	—	—	445

m Motor. ‡‡ Compound Surface Condensing. † Triple.

Fellows & Co., Ltd., Great Yarmouth.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
7 Steam fishing boats, etc...	Wd. & Steel	—	158	428	—

John Chambers, Lowestoft.

27 Fishing smacks & drifters	Wood	British	1,074	2,155	—

Engines for one vessel, La Parisienne, of 155 i.h.p. by same Company.
WORK ON HAND—
Orders on hand for 6 months' work.

Rennie Forrestt S.B., Engineering & Dry Dock Co., Ltd., Wyvenhoe.

28 vessels (tugs, yachts, etc.)	—	Brit & For.	—	5,205	3,850

In the boat-building department they have constructed five 20 ft. Admiralty motor boats, two ship launches, two yacht launches, five patent lifeboats, six ship's boats, and several small rowing boats, and have also carried out an extensive amount of work in connection with their dry dock and repairing department, including the overhaul and fitting out of many high-class yachts.

ENGLISH CHANNEL.

John I. Thornycroft & Co., Ltd., Southampton.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
t H.M.S. Paragon, T.B.D. ..	Steel	British	—	900	25,000
t H.M.S. Porpoise, T.B.D. ..	,,	,,	—	900	25,000
t H.M.S. Unity, T.B.D. ..	,,	,,	—	900	25,000
t H.M.S. Victor, T.B.D. ..	,,	,,	—	900	25,000
† H.M. Candian Customs Cruiser Margaret	,,	Colonial	—	850	2,000
† S.S. St. Patrick, shallow dr. pass. and cargo str. ..	,,	,,	—	350	1,200
m El Lobito, cargo vessel ..	,,	Foreign	—	70	200
Lightships	Iron & Steel	British	—	130	—
Lightships	,,	,,	—	130	—
m Motor launches (various) ..	Steel & Wood	British & Foreign	—	90	400
Internal combustion engines supplied by Thornycrofts for other hulls	—	,	—	—	6,500

WORK ON HAND—

New construction	—	—	—	10,000	205.000

Engines by same establishment.

J. Samuel White & Co., Ltd., East Cowes, I.W.

T.B.D. shallow dr. vessels for special service, special stm. boats for warships	—	Brit. & For.	—	4,838	77,601

WORK ON HAND—

New construction	—	Brit. & For.	—	8,232	112,091

Engines by same establishment.

Stow & Sons, Shoreham.

m Harbinger, sailing yacht ..	Wood	—	—	57	—

WORK ON HAND—

m 2 Yachts	Wood	—	—	68	90

Philip & Son, Ltd., Dartmouth.

11 Vessels (tugs, etc.) ..	—	Various	—	469	1,720

WORK ON HAND—

6 Pass. and cargo vessels ..	—	—	—	800	1,800
5 Other vessels	—	—	—	115	390

And a number of repair jobs.
All engines, except two, by same Company.

Simpson, Strickland & Co., Ltd., Dartmouth.

29 Craft (launches, tugs, etc.)	Steel & Iron	British & Foreign	180	385	1,066
Machinery only (no hulls)	—	—	—	—	530

Engines by same establishment.

Cox & Co. (Engineers), Ltd., Falmouth.

No. 150, pass. & cargo scr. steamer	—	Spanish	—	150	230
4 other bts. (tugs, etc.) ..	—	Brit & For.	—	249	860

Engines, except for one vessel, by same Company.

BRISTOL CHANNEL.

C. H. Walker & Co., Ltd., Sudbrook, nr. Chepstow, Mon.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
3 Hopper barges (steam) ..	Steel	Foreign	—	480ea	440ea
2 Crane barges, towing ..	,,	,,	—	312ea	—
2 Cargo steamers	,,	,,	—	449ea	325ea
2 Hopper barges, towing ..	,,	British	—	45ea	—
2 Skip barges, towing ..	,,	Foreign	—	114ea	—

Isaac J. Abdella & Mitchell, Ltd., Gloucester.

15 Vessels (launches, tugs, etc.)	Steel & Wood	British & Foreign	79	143	469

WORK ON HAND—
2 Launches and sea-going sailing boat and set of engines.
All engines, except for one vessel, by same Company.

t Turbine. † Triple. *m* Motor.

MERSEY.

Isaac J. Abdella & Mitchell, Ltd., Queen's Ferry, nr. Chester.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
‡‡Bonanza	Steel	Spanish	100	—	220
m Pater	„	British	230	—	220
No. 340, steam	„	„	20	—	25
6 Sailing vessels	„	„	250ea	—	—
m Carita	„	„	200	—	120 B.H.P
m Fleurita	„	„	250	—	160 „
Grain Elevating pontoon	Wood	—	—	—	—
2 Pontoons	Iron	—	—	—	—
4 Motor vessels	Wood	Portugnese	—	—	95
Nos. 3, 4, 5 and 6, G.W.R., sailing	Steel	British	100	—	—
10 Dinghies and several punts	Wood	—	—	—	—
Several repair jobs effected.					
WORK ON HAND—					
12 Steel barges	—	—	100ea	—	—
120 ft. Stern wheel steamer	—	—	—	—	—
m Tw.-scr. coaster, etc.	—	—	—	—	—

Five boats engined by same Company.

R. Williamson & Son, Workington.

† Deventia, steamer	Steel	British	363	799	575
† Volana, steamer	„	„	255	615	525

W. J. Yarwood & Sons, Northwich.

‡‡Leverville, scr. steamer	Steel	British	—	150	120
‡ John Calderwood, scr. str.	„	„	—	137	110
m Cresco, barge	„	„	—	76	80
Pontoon and weigbg. erectn.	„	„	—	42	—
Jeanie, dumb barge	Compo	„	—	45	—
‡‡Agnes and Madge, screw steamers	Steel	„	—	190ea	220ea
2 Dumb barges	„	„	—	56ea	—
‡ A. B. Hughes, scr. str.	„	„	—	137	110
2 Dumb barges	„	„	—	500ea	—
Dumb barge	Compo	„	—	75	—
m Barge	Steel	„	—	48	36
‡‡Screw steamer	„	„	—	203	220
Engines only (4 vessels)	—	—	—	—	415
WORK ON HAND—					
4 Dumb barges	Compo	British	—	75ea	—
m 3 Barges	Steel	„	—	138	108
‡‡4 Screw steamers	„	„	—	614	714
Engines only	—	—	—	—	570

Eogines by same Company.

Cammell, Laird & Co., Ltd., Birkenhead and Tranmere.

* Doon, twin screw	Steel	Foreigo	—	1,352	950
gt King Orry, twin screw	„	British	—	1 876	8,000SHP
t H.M.S. Garland, twin screw	„	„	—	—	—
a Bergensfjord, twin screw	„	Foreign	—	10,600	8,500
Khiva, twin screw	„	British	—	8,880	7,000
Khyber, twin screw	„	„	—	8,880	7,000
† Leonard, twin screw	„	Foreign	—	3,321	3,200
Lighters, etc., for shipment, 56	„	„	—	2,392	—
Machinery for H.M.S. Iron Duke	—	British	—	—	—

Engines by same Company.

Isaac Pimblott & Sons, Ltd., Northwich.

31 Vessels (lighters, launches, etc.)	Steel	Foreigo	—	529	—

Vickers, Ltd., Naval Construction Works, Barrow.

H.M.S. Emperor of India	—	British Gov.	—	—	—
R.F.A. Trefod (macby. only)	—	„	—	—	—
H.I.O.M.S. Reshadieh	—	Turk. Gov.	—	—	—
Monitor Javary	—	Brazn. Gov.	—	—	—
Monitor Solimoes	—	„	—	—	—
Monitor Madeira	—	„	—	—	—
Battleship Rio de Janeiro (machinery only)	—	„	—	—	—
Floating dock	—	Argen. Gov.	—	—	—
Caisson	—	British	—	—	—
Various small vessels	—	—	—	—	—
Total tonnage				64,700	
Total I.H.P. constructed				121 000	

Maryport Shipbuilding and Repairing Co., Maryport.

* Rhenass, screw coaster	Steel	—	77	293	325
WORK ON HAND—					
* No. 100	Steel	—	77	293	325

THE RIBBLE.

Lytham Shipbuilding and Engineering Co., Lytham.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
‡‡Sir John Kirk, galv. stern wheeler	Steel	British	472	622	600
22 other vessels, tugs, barges, etc.	Steel	Brit. & For.	1,575 ap.	1,850 ap.	940
1 Set of engines only	—	—	—	—	100
2 Loco marine boilers.					
WORK ON HAND—					
3 Towing barges	Steel	Brit. & For.	ap.96	app.100	—
‡‡Single-screw launch	„	„	app.15	app.25	app.70

Eogines by the same establishment.

m Motor. ‡‡ Compound Surface Condensing. *gt* Geared Turbine.
‡ High Pressure * Compound. *a* Quadruple. † Triple Expansion. *t* Turbine.

ROYAL DOCKYARDS.

H.M. Dockyard, Pembroke.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
t H.M.S. Nottingham, 2nd cl. protected cruiser	Steel	English	—	dis. 5,440	22,000
R.F.A. Trefoil, oil tank vsl.	„	„	—	—	—
WORK ON HAND—					
t H.M.S. Cordelia, light cruiser	Steel	English	—	—	—
R.F.A. Turmoil, oil tank vsl.	„	„	—	—	—

H.M. Dockyard, Portsmouth.

H.M.S. Queen Elizabeth, battleship	Steel	British	—	—	—
WORK ON HAND—					
t H.M.S. Iron Duke, battleship	Steel	British	23,000	—	29,000
H.M.S. Royal Sovereign, battleship	„	„	—	—	—

H.M. Dockyard, Devonport.

H.M.S. Warspite, battleship	—	—	—	—	—
H.M.S. Aurora, light crsr.	—	—	—	—	—
R.F.A. Carol, oiler	—	—	—	—	—

VESSELS ENGINED.

Central Marine Engine Works, West Hartlepool.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
18 vessels, as shown under Wm. Gray and Co., Ltd. (Tees and Hartlepool section)	Wm. Gray & Co., Ltd.	50,935	—
Nos. 238-9		2,740ea	—
	Total	56,415	—

R. & W. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne.

Propelling machinery for 1 Battleship, 2 Cruisers, 1 Destroyer, 1 Ore Steamer, 2 Oil-tank Steamers		tot. 138,650	—

See also Launch Section (Tyne).

North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne and Sunderland.

Name of Vessel.	Owners.	I.H.P.	Press. lbs.
Absirtea	Trieste	2,165	—
Africanic	Gothenburg	1,915	—
Adciao	Havre	1,240	—
Anglo-Brazilian	London	3,640	—
Bestwood	„	1,325	—
Bywell	Newcastle	1,345	—
Buenaventura	London	3,180	—
Belvedere	Trieste	3,900	—
Cedartree	Cardiff	1,185	—
Corvin	Fiume	1,270	—
Dilston	North Shields	1,345	—
Elsdon	Newcastle	1,345	—
Eupion	London	2,400	—
Ecaterini Matsouki	Swansea	1,800	—
Ellerdale	Whitby	2,040	—
Fairhaven	„	1,800	—
Hitchin	London	1,325	—
Iossifoglu	Pireaus	1,985	—
Jedmoor and Kelsomoor	London	1,750ea	—
Keltier	Antwerp	1,395	—
* Kim	Sandefjord	2,940	—
Lycaon	Liverpool	5,500	—
Luz Blanca	London	2,700	—
Magdaleiene Rickmers	Bremerhaveo	2,260	—
Nevisbrook	Glasgow	1,700	—
Humidia	Trieste	2,490	—
Portwood	London	1,325	—
Ridley	Newcastle	1,790	—
Ruol	Cardiff	2,130	—
Ryton	Newcastle	2,140	—
Salamanca	Christiania	1,270	—
Sevilla	„	1,200	—
Silvia	London	3,080	—
Tiara	Newcastle	2,045	—
Tascalusa	London	3,150	—
Voctis	Newcastle	890	—
Winimac	Stockton	3,000	—
Wingate	West Hartlepool	1,185	—
Wentworth	Newcastle	1,950	—
S.S. 280	—	2,060	—
San Isidoro	London	4,700	—
		89,605	—
New Boilers constructed		1,570	—
	Total	91,175	—

Of the above total 47,470 i.h.p. was constructed and fitted at the Northumberland Engine Works, Wallsend, and 43,705 i.h.p. at the Sunderland Engine Works. South Dock Sunderland.

t Turbine.

Plenty & Sons, Ltd., Newbury.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
* 21 Sets Engines	Various	tot. 1,800	—
† 9 Sets Engines	„	tot. 2,730	—
‡‡ 3 Sets Engines	„	tot. 820	—
	Total	5,350	—
Also 32 Kromhout marine oil engines, ranging from 22 to 90 B.H.P.	Various	tot. 1,990	—

Smith's Dock Company, Limited, Middlesbrough.

23 Sets Engines		tot. 13,250	—

Richardsons, Westgarth & Co., Ltd., Hartlepool.

S.S.'s Oosterdyk and Westerdyk		5,000ea	—
S.S. San Francisco		3,000	—
S.S. Frimley		2,500	—
S.S. Tirreno		2,400	—
S.S.'s Wagama and Wascana		2,250ea	—
S.S.'s Rounton Grange, Oldfield Grange, Benheather, Meadip Range, Manchester Civilian, Victorian Transport, Tasmanian Transport, African Transport, Pacific Transport, New Zealand Transport, Queensland Transports, Ocean Transport, Royal Transport, Imperial Transport ond Egyptian Transport		2,150ea	—
No. 2,214		2,100	—
S.S.'s Magdala, Tatra, Midland and Mardinian		2,000ea	—
S.S. Tanis		1,850	—
S.S. Zeta		1,550	—
S.S. Ngakuta		1,500	—
S.S. Hopeful		1,250	—
S.S.'s London Trader, Tees Trader, Llanelly Trader, Valegarth and Northern Coast		1,100ea	—
S.S.'s Garron Head, Orlock Head and No. 536		1,050ea	—
S.S. Glenmavis		1,000	—
Cable Steamer Transmitter		950	—
	Total	81,500	
LAND DEPARTMENT.			
Steam Turbines		33,600	
Rolling Mill Engines		20,000	
	Total	53,600	
	Total I.H.P. for the year	135,100	

In addition to the above, a large amount of miscellaneous work has been completed, including Water Tube Boilers, "Contraflo" Condensing Plants and Regenerative Accumulators. Also Iron and Steel Works Plant including Metal Mixers, Tilting Furnaces, Hydraulic Plate Sheers, etc.

The Wallsend Slipway & Engineering Co., Ltd., Wallsend.

Rosalind, single-screw		2,850	—
San Fraterno and San Gregorio, single-screw		4,600ea	—
San Silvestre and San Tirso, single-screw		3,300ea	—
Kandahar, single-screw		3,650	—
Eburna, single screw		2,400	—
Elsinore single-screw		2,850	—
San Lorenzo, single-screw		4,600	—
t War vessels		115,000	—
C. A. Canfield, single-screw		2,750	—
San Ricardo, single-screw		3,300	—
San Urbano, single-screw		3,300	—
Charles E. Harwood, single-screw		1,000	—
Roumanian Prince, single-screw		2,050	—
	Total I.H.P.	159,550	
34 new boilers in addition, representing		29,630	

Elliott & Garrood, Ltd., Beccles.

24 fishing vessels	Various	4,070	—

Blair & Co., Ltd., Stockton-on-Tees.

S.S. Patagonia	Craig, Taylor & Co.	2,850	—
S.S. Chantala	Richardson, Duck & Co.	3,200	—
S.S. Somersby	Ropner & Sons	1,950	—
S.S. Gorbea Mendi	Euskalduna Co., Bilbao	2,400	—
S.S. Dartwen	Richardson, Duck & Co.	2,300	—
S.S. Clarissa Radcliffe	Craig, Taylor & Co.	2,850	—
S.S. Ariadne Irene	J. L. Thompson & Sons	2,300	—
S.S. Devon City	Ropner & Sons	2,400	—
S.S. Hannah	Tyne Iron Shipbuilding Co.	2,100	—
S.S. Burcombe	Richardson, Duck & Co.	1,950	—
S.S. Wearpool	Ropner & Sons	2,700	—
S.S. Purley	Richardson, Duck & Co.	2,450	—
S.S. Scythian	Ropner & Sons	2,400	—
S.S. Atherstone	Craig, Taylor & Co.	2,250	—
S.S. Eustace	Irvine's Shipbuilding Co.	2,650	—
S.S. Holtye	Northumberland S.B. Co.	2,550	—
S.S. Eastern City	Ropner & Sons	2,400	—
S.S. Caldy	Richardson, Duck & Co.	2,350	—
S.S. Baldersby	Ropner & Sons	1,950	—
S.S. Cabo Tres Forcas	Euskalduna S.B. Co.	1,150	—
S.S. Seapool	Ropner & Sons	2,300	—
S.S. Harbury	Sunderland Shipbuilding Co.	2,650	—
S.S. Falls City	Ropner & Sons	2,400	—

* Compound. † Triple. ‡‡ Compound Surface Condensing.
t Turbine.

Blair & Co., Ltd., Stockton-on-Tees.
(Continued.)

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
S.S. Penistone	Craig, Taylor & Co	2,250	—
S.S. Daleham	Richardson, Duck & Co.	3,000	—
S.S. Bertrand	Robt. Thompson & Sons	2,050	—
S.S. Burdale	Richardson, Duck & Co.	2,250	—
S.S. Saxilby	Ropner & Sons	1,950	—
S.S. Stanley	Irvine's Shipbuilding Co.	2,650	—
S.S. Headley	Craig, Taylor & Co.	2,750	—
S.S. Constantinos XII.	Priestman & Co.	2,300	—
		73,700	

In addition new boilers have been built for steam trawlers, etc., having an aggregate I.H.P. of 4,500. Total for the year, 78,200.

George Clark, Ltd., Sunderland.

S.S.'s Sharon, Corton, Florazan, Durley Chine, Slav, Satrap, Floridian, Photinia, Glenrazan, Lucellum, Shabonee, Dromore, Moto, Renteria, Winterton, San Joaquin, Swanmore, Polykton, Wolverton, Borgland. Total, 20 engines. Total nominal horse-power by Lloyd's Rules, 7,026. Estimated indicated horse-power, 42,150.

John Dickinson & Sons, Ltd., Sunderland.

S.S.'s Ellin, Vasilefs Constantinos, Elvaston, Harflete, Tynehome, Harewood, Dingle Bank, North Pacific, Shirley, Evangeles, Kiruna, Batsford, Kurdistan, Georgios, Salopian, Helmsloch, Newlyn, Den of Ewnie, Mottisfont, South Pacific, R.M.S.P. Radnorshire, R.M.S.P. Merionethshire. The Lloyd's nomioal horse-power is 8,553, and the estimated indicated horse-power 51,360.

George T. Grey, Holborn Eng. Works, South Shields.

† Venus, II, cargo str.		550	—
† Waalsrtroom, cargo str.		1,075	—
† Flying Kestrel pass. tender		1,000	—
† St. Leonard, trawler		460	—
† Honoreva, cargo str.		820	—
Normandie, trawler		700	—
† Figulian and Jeannine, cargo steamers		780ea	—
	8 sets	6,165	

Great Central Co-operative Engineering and Ship Repairing Co., Ltd., Great Grimsby.

† 3 Trawlers	Cochrane & Sons	1,260	—

Charles D. Holmes & Co., Ltd., Hull.

†*Engines for 42 vessels. 20,286 I.H.P.

T. & J. Hosking, Ltd., Dock Head Ironworks, Bermondsey.

nc 10 Sets	Various	780	—
‡‡ 13 Sets	„	1,340	—
		2,120	

MacColl & Pollock, Ltd., Sunderland.

Gotland	Antwerp Engineering Co.	760	—
Candelaria	W. Harkess & Son	760	—
Charles le Borgne	Osbourne, Graham & Co.	1,000	—
W. H. Dwyer	Sunderland S.B. Co.	1,020	—
Mitcham	W. Dobson & Co.	1,260	—
Glenfoyle	North of Ireland S.B. Co.	950	—
Llwyngwair	Antwerp Engineering Co.	1,020	—
Datetree	„ „ „	1,400	—
Suffolk Coast	W. Harkess & Sons	810	—
Kapava	Jonn Crown & Sons	650	—
		9,630	
Nine additional boilers		4,260	
	Total	13,890	

Sisson & Co., Ltd., Gloucester.

Mission Launch	Clyde	56	150
Sisson w.t. boiler only			
4 Vessels	Various	305	—

Have completed during the year about 3,000 brake h.p. "Sisson" vertical enclosed self-lubricating engines, and about 700 brake h.p. vertical open engines.

WORK ON HAND—

nc Launch, s.-scr.	Australian	70/75	160

Also about 1,100 brake b.p. "Sisson" vertical enclosed engines, and about 1,000 brake h.p. vertical open engines.

Amos & Smith, Ltd., Hull.

† 14 Vessels	Cook, Welton & Gemmell	—	—
† 6 Vessels	Cochrane & Sons	—	—
† 1 Vessel	Dundee S.B. Co.	—	—
† 6 Tugs	Export	—	—
	27 sets total	12 271	

† Triple. †* Compound and Triple Expansion. nc Compound Non-Condensing.
‡‡ Compound Surface Condensing.

Parsons Marine Steam Turbine Co., Ltd., Wallsend.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
t H.M.S. Owl	London & Glasgow Co.		
t H.M.S. Garland	Cammell, Laird & Co.		
gt H.M.S. Leonidas	Palmers' S.B. Co.		
gt S.S. Maheno (re-engnd)	Wm. Denny & Bros.		
H.M.S. Penelope, part geared turbines)	Vickers, Ltd.		
H.M.S. Galatea, part geared turbines	Wm. Beardmore & Co. Ltd.		
H.M.S. Inconstant, part geared turbines	,, ,, ,,		
	Total I.H.P.	87,000	

Particulars of mechanical gearing constructed to be used in association with Parsons marine turbines :—

Chinese Destroyer, mechan. gearg.	Ansaldo & Co., Italy	—	—
Ferry steamer Curzon, mechan. gearg.	A. & J. Inglis, Ltd.	—	—
Ferry Steamer, Hardinge, mechan. gearg.	,, ,,	—	—
Ferry steamer, Elgin, mechan. gearg.	,, ,,	—	—
S.S. Paris, mechan gearg.	Wm. Denny & Bros.	—	—
S.S. King Orry, mechan. gearing	Cammell, Laird & Co., Ltd.	—	—

Mechanical gearing for vessels mentioned in the above lists, viz. :—S.S. Maheno, H.M.S. Leonidas, H.M.S. Penelope, H.M.S. Galatea, H.M.S. Inconstant. Total I.H.P., 75,400.

The Shields Engineering & Dry Dock Co., Ltd., North Shields.

Thirteen vessels, including cargo, whalers, etc., total I.H.P. 8,500. In addition to the above work done in 1913, several large repair contracts have been carried out, and at present there is a fair quantity of work to commence the new year.

Vauxhall and West Hydraulic Engineering Co., Ltd., Luton.

9 Boats. 2,050 I.H.P.

SCOTCH.

THE CLYDE, Etc.

Alley & MacLellan, Ltd., Polmadie, Glasgow.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
‡‡Barges	Steel	Egyptian	100	100	—
‡‡Bucket dredgers	,,	,,	600	600	300
‡‡Sand lighters	,,	S. Amer.	1,200	1,200	—
‡‡Barges	,,	Egyptian	120	120	—
‡‡4 Coal lighters	,,	S. Amer.	800	800	—
‡‡2 Barges	,,	E. African	80	80	—
WORK ON HAND—					
‡‡Oil barge	Steel	British	150	150	—
‡‡Single-screw tug	,,	,,	200	100	500

William Beardmore & Co., Ltd., Dalmuir.

H.M.S. Benbow	—	British	—dis.	25,000	30,000
H.M.S. Llewellyn, T.B.D.	—	,,	—dis.	935	24,500
Q.T.S.S. Alsatian	—	,,	—dis.	18,500	20,000

George Brown & Co., Greenock.

Sir Walter Bacon	Steel	—	—	919	—
Campista	,,	—	—	1,309	—
Ardgarth	,,	—	—	769	—
Ardglass	,,	—	—	775	—
Kingfisher	,,	—	—	289	—
Nos. 78 and 79	,,	—	—	42ea	—

John Brown & Co., Ltd., Clydebank.

Ambuscade, T.B.D.	—	British	—	—	—
t Aquitania, quad. screw	—	Cunard	—	—	—
Tiger, battle cruiser		British Ad.		—	—
Emperor Peter the Great, pass. and cargo steamer		Russian	—	—	—
Emperor Nicolai I., pass. and cargo steamer		,,	—	—	—
Almirante Latorre and Empress Maria, battleships (main and aux. machinery only)		Foreign		—	—
5 Vessels				82,722	—
Machinery constructed				—	239,000

Caird & Co., Ltd., Greenock.

a Nagoya and Nellore, tw. scr	Steel	British	4,249ea	6,853ea	4,500ea
a Berrima and Borda, tw.-scr.	,,	,,	7,036ea	11,136ea	9,000ea

Engines by same Company.

The Campbeltown Shipbuilding Co., Campbeltown, N.B.

Neuquen, S.S.	Steel	British		3,583	—
Kano, S.S.	,,	,,		1,236	—

‡‡ Compound Surface Condensing. *a* Quadruple. *t* Turbine. *gt* Geared Turbine.

W. Chalmers & Co., Ltd., Rutherglen, Glasgow.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
m Inissharon and Inisstrahull, screw motor coasters	Steel	British	240ea	—	240ea
‡ Talcahuano, floating crane pontoon	,,	Chilian	675	—	700
‡‡Neptuno, screw tug	,,	Guayaquil	23	—	180
‡‡Toamie, salvage tug and tdr.	,,	N. Zealand	103	—	526
WORK ON HAND—					
m Inissulsa and Inisserd, screw motor coasters	Steel	British	265ea	—	240ea
Motor yacht	,,	,,	20	—	—

The Greenock & Grangemouth Dockyard Co., Ltd., Greenock and Grangemouth.

GRANGEMOUTH YARD.					
Imperoyal, scr. oil tanker	Steel	British	—	2,253	1,500
Impoco, screw oil tanker	,,	,,	—	2,257	1,500
Morinda, scr. cargo and pass.	,,	,,	—	1,971	1,290
Moorfoot, screw cargo	,,	,,	—	2,046	1,550
Holmpark, screw cargo	,,	,,	—	1,475	1,000
GREENOCK YARD.					
Carpati, screw cargo	Steel	Roumanian	—	4,336	2,250
Uneas, scr. oil tanker	,,	British	—	4,722	2,900
Bucegi, screw cargo	,,	Roumanian	—	4,330	2,250
Saiot Cecilia, screw cargo	,,	British	—	4,011	2,250
Saiot Kentigern, scr. cargo	,,	,,	—	4,411	2,250

A. & J. Inglis, Ltd., Point House Shipyard.

gt Elgin and Hardinge, Tw.S.S.	Steel	British	262ea	654ea	2,450ea
† Cabo Santa Maria, paddle st.	,,	Argentine	1,521	2,648	3,050
† Cabo Corrientes, paddle str.	,,	,,	1,525	2,650	3,050

Engines by same Company.

Lobnitz & Co., Ltd., Renfrew.

* Penelope, bucket dredger	—	Foreign	—	2,065	2,400
* Coucon and Lagunas, hopper barges	—	British	—	442ea	243ea
† Lord Devonport and Lord Ritchie, hopper barges	—	,,	—	970ea	1,218ea
* Commaudant Lamy, stern wheel steamer	—	Foreign	—	59	160
* Roger Noguès, stern wheel steamer	—	,,	—	250	300
† Queen Mary, bucket drdgr.	—	Colonial	—	636	1,200
m 2 Tin dredgers	—	British	—	875	800
* 2 Dredgers	—	Foreign	—	431	900
3 Hopper barges	—	British	—	556	—
3 Lighters	—	Foreign	—	78	—
* 2 Gold dredgers	—	,,	—	245	350
3 Rock cutters	—	,,	—	438	500

R. McAlister & Sons, Dumbarton.

Uyata, motor yacht	Wood	—	24	—	—

A. Munro, Ardrishaig.

m 3 Auxiliary luggers	Wood	—	— total	52	—

Murdoch & Murray, Ltd., Port Glasgow.

Linmere, T.S.S.	Steel	British	—	1,579	1,200
Poonbar, T.S.S.	,,	,,	—	909	983
Alfred H. Read, S.S.	,,	,,	—	457	650
Ant, S.S.	,,	,,	—	545	650
Paladin, T.S.S.	,,	,,	—	326	1,500
WORK ON HAND—					

Two steel twin-screw passenger and cargo steamers.

Napier & Miller, Ltd., Old Kilpatrick.

† Gerasimos, S.S.	—	Foreign	3,845	—	1,750
† Toyora Maru, S.S.	—	,,	2,642	—	1,594
† British Monarch, S.S.	—	British	5,750	—	2,700
† Carioca, T.S.S.	—	Foreign	165	—	300
a Napierian, S.S.	—	British	6,300	—	3,000

Ritchie, Graham & Milne, Whiteinch.

Steam launch and tug	Steel	Foreign	95	—	—
Water boat	,,	,,	130	—	—
2 Stern wheelers	,,	British	80	—	140
4 Sailing Barges	,,	,,	120	—	—
Crane barge, twin-screw	,,	Foreign	450	—	300
WORK ON HAND—					

1 crane barge, 2 stern wheel steamers and 1 twin-screw steamer.

Scott & Sons, Bowling.

‡‡Volunteer, screw tug	Steel	—	—	105	400
† Mauritanie, screw steamer	,,	—	—	767	600
† Clandeboye, screw steamer	,,	—	—	614	700
‡‡Nos. 245-6-7 3 screw tugs	,,	—	—	67ea	250ea
Comber, screw steamer	,,	—	—	489	550
Dunnet Head sc. steamer	,,	—	—	343	430
WORK ON HAND—					

Steamers of 1,630 tons aggregate.

Robt. Duncan & Co., Ltd., Port Glasgow.

† Ardgair, screw steamer	Steel	British	—	5,120	2,750
† Ardgorm, screw steamer	,,	,,	—	5,131	2,750

m Motor. ‡‡ Compound Surface Condensing. * Compound. † Triple. *gt* Geared Turbine. ‡ High Pressure. *a* Quadruple.

The Fairfield Shipbuilding & Engineering Co., Ltd., Govan.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
t Calgarian, four-screw ..	—	British			
a Llanstephan Castle, tw.-scr.	—	,,			
t Fortune (H.M. Ship), tw.-scr.	—	Brit. Adm.		33,200	
t Laforey (H.M. Ship), tw.-scr.	—	,,			
t Lawford (H.M. Ship), tw.-scr.	—	,,			201,000
t Louis (H.M. Ship), tw.-scr.	—	,,			
Machinery only for H.M. ships building at Chatham Dockyard.					
t Lowestoft, cruiser, tw.-scr.	—	Brit. Adm.	—		
t Arethusa, cruiser, four-scr.	—	,,	—		

Bow, McLachlan & Co., Ltd., Paisley.

C 142, sailing	—	Brit. Gov.	—	306	—
J. Oswald Boyd, twin-screw	—	British	—	1,806	—
Rusinga, screw	—	Brit. Gov.	—	1,440	—
4 Tugs, screw	—	Foreign	—	220	—
2 Barges, sailing	—	,,	—	464	—
4 Barges, sailing	—	Brit. Gov.	—	628	—
Total I.H.P. for the year	—	—	—	—	12,100

Cochrane & Sons, Ltd., Selby.

39 Trawlers, coasters, etc.	—	British	—	9,986	17,605

Barclay, Curle & Co., Ltd., Glasgow.

City of Corinth, single screw	—	British		5,870	3,700
Malda, twin screw	—	,,		7,884	5,500
Manora, twin screw	—	,,		7,875	5,500
Llandovery Castle, tw. scr.	—	,,		11,800	7,500
Mashobra, twin screw ..	—	,,		8,500	5,500
Bandra, single screw ..	—	,,	—	3,370	2,500
Engines by same Company.					

John Fullerton & Co., Paisley.

* Upas, screw	Steel	British			470	774
† White Rose, screw	,,	,,		—	632	644
† Eurus, screw	,,	,,		—	825	700
* Cyclops, screw	,,	Urugun.		—	226	747
† Allerton screw	,,	British		—	610	650

Archd. McMillan & Son, Ltd., Dumbarton.

Phidias, stm.	Steel	British	—	5,624	—
Ceylon, stm.	,,	Dutch	—	5,046	—
Strabo, stm.	,,	British	—	4,910	—

Wm. Simons & Co., Ltd., Rentrew.

Sand pump dredger	British	—	3,083	4,660
Pontoon	,,		160	250
Bucket dredger	,,		617	480
Sand pump dredger	Foreign		100	120
Bucket dredger	British		200	360
Sand pump dredger	Foreign		100	120
4 Hopper barges	,,		720ea	650ea
2 Bucket dredgers	,,		720ea	1,300ea
Grab dredger	British		100	100
Sand pump dredger	,,		2,000	2,300
Pumping plant	,,	—	400	750
Engines by same Company.				

Besides the above, a large quantity of dredging machinery, boilers, etc., were also supplied during the year.

Wm. Denny & Brothers, Dumbarton.

Crane lighter, No. 2	—	British	—	2,380	—
Ardent, T.B.D.	—	,,	—	1,100	—
t Paris	—	,,	—	1,774	—
Pegu. S.S.	—	,,	—	6,339	—
Empress Ekaterina II. and Emperor Alexander III., T.S.S.'s	—	Foreign	—	5,151ea	—
Loyal, T.B.D.	—	British	—	1,100	—
Hororata, T.S.S.	—	,,	—	9,462	—
Coringa, tug	—	,,	—	293	—
Light draught vessels taken to pieces and shipped abroad	—	—	—	8,053	—

A. Robertson & Co., Argyleshire.

m No. 18	Wood	British	—	110	175
WORK ON HAND—					
m No. 6	Wood	British	—	83	110

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

Ussa, S.S.	—	British	2,066	1,600
Carlo, S.S.	—	,,	1,987	1,600
Ferencz József Király, S.S.	—	Foreign	3,853	3,750
Ferencz Ferdinánd, S.S. ..	—	,,	3,853	3,750
Caisson, dock gate	—	British	920	—
Spuma (machinery only) ..	—	Foreign	—	2,300
Laguna (machinery only)	—	,,	—	2,300
Matsura Maru (machy. only)	—	,,	—	1,800
Engines by same establishment.				

David & William Henderson & Co., Ltd., Partick.

Cbakrata, screw	Steel	British		5,682	4,160
Ingoma, screw	,,	,,		5,686	4,050
Chalister, screw	,,	,,		5,344	2,890
Nortonian, screw	,,	,,		6,367	3,500
Novian, screw	,,	,,	—	6,367	3,500
Engines by same Company.					

Charles Connell & Co., Ltd., Scotstoun.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Dewa		British	—	3,802	2,100
Knight Companion	—	,,	—	7,241	3,300
Indra	—	,,		5,712	3,600
Clan Maccorquodale	—	,,		5,120	3,600
Discoverer	—	,,		5,421	3,300
Dramatist	—	,,	—	5,421	3,300

Dunlop, Bremner & Co., Ltd., Port Glasgow.

Serbino, shelter deck	British		2,205	1,500
Kyno, shelter deck ..	,,		2,203	1,500
Cavallo, shelter deck ..	,,		2,085	1,500
Triton, shelter deck	Dutch		1,915	1,400
Guido, shelter deck	British		2,092	1,500
Engines by same Company.				

McLaren Bros., Dumbarton.

m 25 Small boats	Wood & Steel	British & Foreign	—	120	446
WORK ON HAND					
6 Motor vessels	—	—		—	—

The Abercorn Shipbuilding Co., Paisley.

‡‡Saaid, water carrier	Steel	British	157	265	300

Wm. Fife & Sons, Fairlie, Ayrshire.

7 Cutter yachts, etc. ..	Wood	—	199	—

Peter McGregor & Sons, Kirkintilloch.

Inniseane, motor coaster ..	Steel	British	—	95	110
Innisfree, motor coaster ..	,,	,,		95	110
Innisglora, motor coaster ..	,,	,,		117	110
Innishowen, motor coaster	,,	,,		118	110
‡‡No. 69, tug	,,	,,		53	150
WORK ON HAND					
Two tugs and one cargo vessel.					

Donald Munro & Sons, Inveraray.

2 Motor yachts	Wood	British	21	—	33
WORK ON HAND—					
5 Sailing boats	Wood		35	—	—

Yarrow & Co., Ltd., Glasgow.

Lark, Linnet, Laverock and Landrail, T.B.D.'s		Brit. Adm.	—	807ea	24,500ea
Miranda, Minos and Manly, spec. T.B.D.'s	—	,,		742ea	22,000ea
m 2 Torpedo boat destroyers	—	Jap. Gov.	—	838	22,000
Shu-Hun, shallow dr. str. ..	—	Chinese	—	346	1,000
Douro and Guadiana, tor pedo boat destroyers ..	—	Port. Gov.	—	559ea	11,000ea
m Republica, motor boat ..	—	,,	—	43	80
21 Yarrow Water-tube Boilers for Chilian battleship Almirante Latorre	—	Chiln. Gov.	—	—	40,000
21 Yarrow Water-tube Boilers for Chilian battleship Almirante Cochrane. To be completed 1914 ..	—	,,	—	—	40,000
Various Steam Drums, Water Pockets and Superheaters for battleships and destroyers	—	Ital. Gov.	—	—	—
Machinery and Boilers for the monitor Maranhao ..	—	Braz. Gov.	—	—	—

D. M. Cumming & Co., Blackhill Shipyard, Glasgow.

2 Barges	Steel	British		60ea	—
WORK ON HAND —					
2 Barges	Steel	British	—	—	—

Ailsa Shipbuilding Co., Ltd., Troon and Ayr.

Asturiano, single screw	—	Argentine	—	2,835	—
Argentino, single screw ..	—	,,	—	2,835	—
Tritaõ, single screw tug ..	—	Brazilian	—	119	—
Irrawadi, single screw ..	—	British	—	1,138	—
Oriole, single screw	—	,,	—	2,095	—
Barges, etc.	—	Brazilian	—	1,133	—
Engines for Nos. 1, 2 and 5 by same Company.					

Scotts' Shipbuilding & Engineering Co., Ltd., Greenock.

T.S.S. Andania	—		13,404	8,000
T.S.S. Alaunia	—		13,404	8,000
S.S. Helenus	—	—	7,554	5,500
S.S. Tatarrax	—	—	6,665	3,000
S.S. Orubian	—	—	3,986	2,500
Engines by same Company.				

Fleming & Ferguson, Ltd., Paisley.

Boxer, dredger	—	Indian	—	1,000	1,500
Nos. 414, 415 and 416, 3 barges	—	H.M. Gov.	—	1,000ea	—
Lagos-Romulus, dredger ..	—	,,	—	1,400	2,500
No. 413, dredger	—	Indian	—	900	1,000
Lagos-Remus, T.S. tug ..	—	H.M. Gov.	—	300	900
No. 419, dredger	—	British	—	500	600
No. 420, harbour service ..	—	W. African	—	1,500	1,800
No. 416, barge	—	H.M. Gov.	—	1,000	—
No. 424, dredger	—	British		900	1,100
C.L.T. No. 3, hopper barge	—	,,		1,000	800
† 2 Sets	—	—	—	—	2,800
WORK ON HAND—					
3 Vessels	—	—	—	3,500	—
Engines by same Company.					

a Quadruple. *t* Turbine. * Compound. † Triple *m* Motor.

m Motor. ‡‡ Compound Surface Condensing. † Triple.

Russell & Co., Shipbuilders, Port Glasgow.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Seiyo Maru, shel. dk. pass. and cargo steamer ..	—	Japanese	—	6,491	—
Colorado, shel. dk. cargo str.	—	British	—	6,180	—
Tottori Maru, cargo str. ..	—	Japanese	—	5,915	—
Tokushima Maru, cargo str.	—	,,	—	5,910	—
Verdala, cargo steamer ..	—	British	—	5,879	—
Den of Airlie, cargo str. ..	—	,,	—	5,864	—
Den of Ogil, cargo str. ..	—	,,	—	5,689	—
Plutarch, cargo steamer ..	—	,,	—	5,613	—
Kelvinia, cargo steamer ..	—	,,	—	5.039	—
Jose de Larrinaga, shel. dck. cargo steamer	—	,,	—	5,016	—
Socrates, cargo steamer ..	—	,,	—	4,978	—
Vitruvia, bulk oil str. ..	—	,,	—	4,752	—
Saint Winifred and Loch-na-Torran, cargo steamers	—	,,	—	4,572ea	—
Inverbervie, cargo steamer	—	,,	—	4,309	—
Matsura Maru, cargo str. ..	—	Japanese	—	3,089	—

Ferguson Bros., Port Glasgow.

Cowpen, buck. hop. dredr.	—	British	—	1,400	1,750
Two suc. hop. dredgers ..	—	,,	—	2,400	3,360
Ludwig Wiener, pass ten. and tug	—	,,	—	700	2,550
William H. Raeburn, buck. dredger	—	,,	—	500	500

Engines by same Company.

William Hamilton & Co., Port Glasgow.

† Colusa	—	British	—	5,732	3,000
† Saint Theodore	—	,,	—	4,991	2,400
† Jan Van Nassau	—	Dutch	—	3,394	2,600
† Lodewyk Van Nassau ..	—	,,	—	3,396	2,600
† Radja	—	,,	—	7,558	5,150
† Mexicu	—	Mexican	—	2,547	2,000
† Roepat	—	Dutch	—	7,558	5,150

Alex. Stephen & Sons, Ltd., Govan.

Bayano, twin-screw	Steel	British	—	5,947	—
Gelria, twin-screw	,,	Dutch	—	14,053	—
Clan Macquarrie, scr. str.	,,	British	—	5,060	—
Tubantia, twin-screw.. ..	,,	Dutch	—	14,053	—
Takada, twin-screw	,,	British	—	8,600	—
			Total I.H.P.		38,350

Engines by same Company.

FORTH.

John Cran & Co., Leith.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Trusty, twin-screw tug ..	—	—	—	150	950
2 Screw tugs	—	—	—	50ea	290ea
Gladstone, screw tug ..	—	—	—	215	950
2 Auxiliary motor ketches	—	—	—	95ea	120ea

Extensive repairs and dry dock work have also been carried out.
Engines for 4 vessels by same Company.

Hawthorns & Co., Ltd., Leith.

Junction Bridge Yard :—					
St. Serf, screw yacht ..	Steel	British	—	Y.M. 486	1,000
Lucena, screw steamer ..	,,	,,	—	243	450
Victoria Dock Yard :—					
St. Fergus, screw steamer	Steel	British	—	390	600
Battle practice target ..	—	Brit. Adm.	—	—	—
Battle practice target ..	—	,,	—	—	—
WORK ON HAND (latter yard) —					
Ila and Ife, T.S. motor ships	Steel	British	—	—	—

A. Jeffrey & Co., Alloa.

Innisinver and Innisjura, motor coasters	Steel	British	65ea	127ea	100ea
WORK ON HAND—					
No. 10, motor coaster ..	Steel	British	—	130	150

Ramage & Ferguson, Ltd., Leith.

† Wendy, screw steamer ..	Steel	British	—	958	700
† St. Margaret, screw steamer	,,	,,	—	942	1,450
* Thornfield, screw steamer	,,	,,	—	487	500

Engines by same Company.

Mackay Bros., Alloa.

† Rochelle, single screw ..	Steel	British	—	1,487	900
† Eupion, sin. scr. oil tanker	,,	,,	—	3,575	2,400

‡‡ Compound Surface Condensing. † Triple. * Compound.

THE TAY.

Caledon Shipbuilding & Engineering Co., Ltd., Dundee.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Sebastian, twin-screw ..	Steel	British	—	3,400	2,000
m Selene, twin-screw	,,	Foreign	—	3,700	2,200
a Norwegian	,,	British	—	6,327	2,725
WORK ON HAND—					
† Alban	Steel	British	—	5,300	2,300
† Barima	,,	,,	—	1,500	1,200
† Belize	,,	,,	—	1,500	1,200
† Formby	,,	,,	—	1,400	2,700

All quadruple and triple-expansion machinery by same Company.

THE DEE.

The John Duthie Torry Shipbuilding Co., Torry, Aberdeen.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Gioette, steam trawler ..	—	French	—	269	520
Manor, Nellie Braddock, Kumu and Sarba, st. trlrs.	—	British	—	314ea	565ea
Jupiter and Harle, stm. trlrs.	—	French	—	259ea	550ea
Orthos and Onetos, st. trlrs.	—	British	—	217ea	400ea
Tillycorthie, stm. cargo bt.	—	,,	—	382	450
Michaelmas Daisy and Wivenhoe, steam drifters	—	,,	—	99ea	200ea
Northesk, steam drifter ..	—	,,	—	100	240
Bega, steam trawler	—	,,	—	314	565

Alexander Hall & Co., Ltd., Aberdeen.

Braconlea, trawler	—	British	—	205	450
Princess Royal, trawler ..	—	,,	—	213	450
Plethos, trawler	—	,,	—	210	420
Cairnside, cargo vessel ..	—	,,	—	560	750
Controller, trawler	—	,,	—	201	420
Confederate, trawler	—	,,	—	202	420
Ocean Fisher and Poseidon, drifters	—	,,	—	96ea	250ea
Braconlynn and Pitstruan, trawlers	—	,,	—	206ea	450ea

Engines by same Company.

Hall, Russell & Co., Ltd., Aberdeen.

Ugiebank, steam trawler ..	—	British	—	205	450
Marthe, steam trawler ..	—	French	—	259	580
Strathafton and Stratbcarron, steam trawlers	—	British	—	211ea	450ea
South Bulli and Woniora, cargo..	—	Australian	—	820ea	1,000ea
Sparta, pass. and mail ..	—	Austrian	—	1,066	1,300
Strathnethy and Strathclunie, steam trawlers ..	—	British	—	211ea	450ea
Zealous water tank vessel	—	,,	—	210	180
Strathella and Strathclova, steam trawler	—	,,	—	211ea	450ea
John H. Irvin, Benn Iver, Ben Torc and Ben Lora, steam trawlers	—	,,	—	199ea	475ea
Nairana, steam trawler ..	—	,,	—	225	450
W. H. Podd, steam trawler	—	,,	—	225	450

Engines and boilers by same Company.

VESSELS ENGINED.

Aitchison, Blair, Ltd., Clydebank.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
‡‡Comber, single-screw .	Scott & Sons, Bowling	700	130
††Clandeboye, single-scr.	,, ,, ...	900	180
††2 Vessels, single-screw	Foreign	1,800	180
‡‡3 Vessels, single-screw..	,, ...	390	130
nc 1 Vessel, single-screw ..	,, ...	80	150
	Total ..	3,870	

WORK ON HAND—
5 Sets, total 3,500 I.H.P.

John G. Kincaid & Co., Ltd., Greenock.

† Colorado	Russell & Co.	3,500 —
† Plutarch	,, ,, ...	2,750 —
† Tottori Maru	,, ,, ...	3,200 —
† Inverbervie and Saint Winifred	,, ,, ...	2,250ea —
† Ardgair & Ardgorm ..	Robt. Duncan & Co.	2,750ea —
† Bucegi	Greenock & Grangemouth Co.	2,250 —
† Moorfoot	,, ,, ,,	1,550 —
† Gerasimos	Napier & Miller, Ltd.	2,250 —
† Toyora Maru	,, ,, ...	1,650 —
† Nimrod..	Stab. Teen. Triestino	3,200 —
† S.S. No. 46	Cant. Nava. Triestino	2,750
		33,100
Sundry Boiler contracts		3,550
	Total..	36,650

‡‡ Compound Surface Condensing. †† Triple Surface Condensing.
† Triple Expansion. *m* Motor. *a* Quadruple.
nc Compound Non-condensing.

David Rowan & Co., Glasgow.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Dora & Iris, single-scr...	Cant. Nav. Triestino	3,000ea	—
† Dewa, single-screw	C. Connell & Co.	2,500	—
† Knight Companion, sin.-scr.	„	3,400	—
† Malaspina and Galiano, single-screw	Dublin Dockyard Co.	1,360ea	—
† Carpati, single-screw	Greenock & Grangemouth Co.	2,250	—
† Mexico, single-screw	Wm. Hamilton & Co., Ltd.	2,100	—
† Saint Theodore, single-screw	„ „ „	2,700	—
† Lodewyk Van Nassau, Jan Van Nassau & Crofton Hall, single-screw	„ „ „	3,000ea	—
a Colusa, single-screw	„ „ „	3,700	—
† Radja, single-screw	„ „ „	5,500	—
† Ceylon and Strabo, single-screw	A. McMillan & Son	2,700ea	—
† Pascal and Phidias, single-screw	„ „	2,900ea	—
† British Monarch, sin.-scr.	Napier & Miller	2,900	—
Jose de Larrinaga, sin.-screw	Russell & Co.	2,500	—
		56,470	
And 18 boilers for shipment		9,000	
	Total	65,470	

James Ritchie, Esq., Glasgow.

* S.T. Toanni	Wm. Chalmers & Co., Rntberglen	500	—
* S.T. Cyclops	J. Fullerton & Co., Paisley	800	—
Shipped abroad	Shipped abroad	1,000	—
	Total	2,300	

Gauldie, Gillespie & Co., Glasgow.

‡‡Ormsa	Larne Shipbuilding Co.	120	—
‡‡2 Tugs	Scott & Sons	280ea	—
‡‡Dunnet Head	„ „	500	—

Denny & Co., Dumbarton.

† Crane lighter No. 2, tw screw		—	—
t Wahine		—	—
t H.M..S Ardent		—	—
gt Paris		—	—
† Pegu, single-screw		—	—
† Empress Catherine II. & Emperor Alexander III.,tw. sc.		—	—
Also a number of sets of machinery for light draught vessels for shipment abroad.	Total	82,600	

J. Abernethy & Co., Aberdeen.

† Ginette, trawler	John Duthie Torry Co.	550	180
† Manor, Nellie Braddock, Kumir and Sarba, trawlers	„ „ „	600ea	180
† Tillycorthie cargo str.	„ „ „	480	180
† Northesk, steel drifter..	„ „ „	250	180
† County of Inverness, wooden drifter	G. Smith jun., Buckie	275	180
	Total	3,955	
WORK ON HAND—			
† Bega, trawler	John Duthie Torry Co.	600	180
† 3 trawlers	„ „ „	550ea	180ea

Campbell & Calderwood, Paisley.

Ferry Steamer, triple-screw	400	—
nc Sternwheel engine	80	—
‡‡Screw engine	210	—
nc Sternwheel engine	90	—
nc Sternwheel engine, compound non-condensing	80	—
‡‡Screw engine	200	—
‡‡Screw engine	110	—
‡‡Screw engine	80	—
nc Two screw engines	100	—
†† Two screw engines	200	—
‡‡Twin-screw engines	400	—
‡‡Twin-screw engines	900	—
Total	2,850	

Hulls built abroad.

Cooper & Greig, Dundee.

† 2 sets engines		1,500ea	—
‡‡2 sets engines		250ea	—
	Total	3,500	
WORK OH HAND—			
† 1 set engines		1,300	—
† 1 set engines		1,000	

† Triple. *a* Quadruple. * Compound. ‡‡ Compound Surface Condensing.
t Turbine. *gt* Geared Turbines. *nc* Compound Non-Condensing.
†† Triple Surface Condensing.

Fishers, Ltd., Paisley.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
‡‡Neptune Guayaquil	Wm. Chalmers & Co., Ltd.	100	130
† George Dinsdale	Scott & Sons	380	160
† Volunteer	„ „	380	160
	Total	860	
WORK ON HAND—			
† Name not known yet..	John Fullerton & Co.	640	180
‡‡ „ „	Peter McGregor & Sons	150	130
	Total	790	

W. V. V. Lidgerwood, Esq., Whifflet.

† Plethos	A. Hall & Co.	500	180
† Poonhar, twin-screw	Murdock & Murray	1,000	200
† Mauritanic	Scott & Sons	650	180
‡ Dogger Bank	Cochrane & Sons	650	200
† Gusty and Viking	Montrose Shipbuilding Co.	300ea	180
† Harle and Jupiter	J. Duthie Torry	600ea	180
† Orthos and Onetos	„ „	500ea	180
† Collairnie	Ardrossan Dry Dock Co.	500	180
* Golden Dawn and Grey Feather	Stevenson & Asher	220ea	140
* Golden Feather	W. & G. Stephen	220	140
	14 sets	6,760	

Muir & Houston, Ltd., Glasgow.

† Linmere, Cargo carrier	Murdoch & Murray	1,300	180
† H.M.S. Ant, Fleet tender	„ „	700	180

Rankine & Blackmore, Greenock.

† Campista	Geo. Brown & Co.	670	160
† Neuquen	Campbeltown Sh. Co.	2,100	185
† Kamo	„ „	1,050	180
† Uncas	Greenock & Grangemouth Co.	2,900	180
† Saint Cecilia and Saint Kentigern	„ „	2,250ea	180
† Verdala	Russell & Co.	3,300	180
† Seiyo Maru	„	3,100	180
† Tokushima Maru	„	3,250	180
† Vitruvia	„	2,900	180
† Den of Ogil and Soccrates	„	3,000ea	180
† Kelvinia	„	2,600	180
	Total	35,870	

Menzies & Co., Ltd., Wet Dock, Leith.

‡‡Flowing Tide	J. C. Stephen	175	—

Ross & Duncan, Glasgow.

During the year 1913, Messrs. Ross & Duncan constructed and fitted on board screw vessels on the Clyde 14 sets of machinery, aggregating 11,500 indicated horse-power, and shipped abroad 15 sets aggregating 3,750 indicated horse-power, making a total output for the year of 29 sets of 15,250 I.H.P.

Dunsmuir & Jackson, Ltd., Glasgow.

The output by Messrs. Dunsmuir & Jackson, Ltd., of marine engines during the year consisted of seven sets triple-expansion engines, total 21,000 I.H.P.

IRISH.

The Larne Shipbuilding Co., Larne Harbour.

2 Motor barges	Steel	—	180	—	—
WORK ON HAND—					
Coasting steamer, 95 ft., two steam tugs.					

Harland & Wolff, Ltd., Belfast.

†*t* Katoomba, triple screw	Steel	British	—	9,424	9,100
†*t* Andes, triple screw	„	„	—	15,620	12,150
†*t* Orduna, triple screw	„	„	—	ap.15,600	9,150
† Attendant, twin screw	„	„	—	317	580
a Maryland, single screw	„	„	—	4,731	3,730
†*t* Alcantara, triple screw	„	„	—	ap.15,600	12,150
a Missouri, single screw	„	„	—	app.5,000	3,730
† Egba, single screw	„	„	—	app.5,000	2,800

Engines by same Company.

‡‡ Compound Surface Condensing. * Compound. † Triple.
†*t* Triple Expansion and Turbines. *a* Quadruple. ‡ High Pressure.

Workman, Clark & Co., Ltd., Belfast.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Caisson T.	Steel	British	—	600	—
a Tenadores, twin-screw	,,	,,	—	7,783	7,500
a Calamares, twin-screw	,,	,,	—	7,782	7 500
† Patia, twin-screw	,,	,,	—	6,103	5 500
† Ulysses, twin-screw	,,	,,	—	14,499	8,000
† Patuca, twin-screw	,,	,,	—	6,103	5 500
† Eumaeus, single-screw	,,	,,	—	6,696	5 000
† Phemius, single-screw	,,	,,	—	6,699	5,000
† Cardiganshire and Carnarvonshire, twin-screw	,,	,,	—	9,426ea	5,400ea
† Star of Victoria, twin-screw	,,	,,	—	9,100	5,400

Engines by same Company.

Dublin Dockyard Co., Dublin.

† Summerfield, scr. str.	Steel	British	270	—	820
† Malaspina and Galiano, 2 fishery patrol cruisers	,,	Canadian	129ea	—	1,360ea
* Patricia, scr. cargo str.	,,	British	342	—	950
† Streatham, scr. cargo str.	,,	,,	610	—	950
WORK ON HAND—					
3 vessels and an iron and steel lightship	—	—	3,520	—	3,000

VESSELS ENGINED.

MacColl & Co., Ltd., Abercorn Basin, Belfast.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
WORK OH HAND—			
† Engines		750	180

FRENCH.

Baheux Freres, Boulogne-sur-Mer

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Afrique II., trawler	Steel	French	198	526	720
Alice, trawler	,,	,,	66	98	200

Engines by Caillard & Co., Le Havre.

WORK ON HAND—					
St. Joachim and Semper, drifters	Steel	—	200ea	—	—
Nelly, trawler	,,	—	98	—	—
St. Wandrille, pass. boat	Wood	—	60	—	—

Blasse fils et de St Quentin, Chantenay s Loire, Nantes

Two Tank Boats, for Arsenal de Brest and Cherbourg	Steel	French	200	—	—
Pontoon, for Arsenal, Brest	,,	,,	150	—	—
Ile d'Oberon, pass. steamer	,,	,,	70	—	—
Steam Boiler, Viand system	—	—	—	—	—

A large number of boats of smaller tonnage also.

Leon Letevre, Boulogne-sur-Mer

Pontoon	Wood	French	—	150	—
18 other vessels	—	—	total	128	
WORK ON HAND—					
5 Vessels	Wood	French	— total	70	—

Cie. des Messageries Maritimes, La Ciotat

a Andre-Lebon, packet boat	Steel	French	ab. 7,600	ab.13,100	11,000

Engines by same Company.

Ste. Anon. des Ateliers et Chantiers de la Loire, Nantes

† Isabelle, cargo-boat	Steel	French	1,530	2,792	1,200
† Mihari, twin-screw tug	,,	,,	—	225	1,500
† Dakar, hopper	,,	,,	—	150	—
† Henriette, cargo-boat	,,	,,	1,241	2,005	1,200
† Champlain and Dupleix, emigrants and cargo	,,	,,	4,651ea	7,418ea	4,000ea
† Marie-Louise, cargo-boat	,,	,,	1,241	2,005	1,200
WORK ON HAND—					
† Chateau Palmer, Chateau-Yquem, Chateau-Lafote, and Chateau-Latour, cargo-boats	Steel	French	ab. 860 each	ab.2,125 each	ab.1,780 each
dm Tug	,,	,,	—	—	300

Two Caissons Dry Dock Doors for new Admiralty Dock, Toulon.
Engines by the same Establishment.

dm Diesel Motor. a Quadruple. * Compound. † Triple.

Ste. Anon. des Chantiers et Ateliers de la Gironde, Bordeaux

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† 2 Tugs	Steel	French	—	273dis.	500
WORK ON HAND—					
†/ Languedoc, Dreadnought	Steel	French	—	25,200dis.	18,620
† Forthos, packet boat	—	—	—	18,100dis.	9,000
Two Submarines	—	—	—	—	—

Floating dock can dock a boat of 1,200 tons and lift a submarine of 550 tons.

Ste. Anon. des Chantier et Ateliers de St Nazaire (Penhoet)

DES CHANTIERS DE L' ATLANTIQUE, ST. NAZAIRE-SUR-LOIRE.

Lorraine, Dreadnought	Steel	French	23,500dis.	—	27,500
†/ Flandre, packet boat, 4 scrs.	,,	,,	11,500dis.	—	11,000
Lutetia, packet boat, 4 scrs.	,,	,,	16,750dis.	—	25,000
WORK ON HAND—					
t Paris, packet boat, 4 scrs.	Steel	French	37,500dis.	—	50,000
†/ Flandre, Dreadnought	,,	,,	37,500dis.	—	36,000

Engines by same Company (Machinery only) for "Flandre," which is being built by Arsenal de Brest.

Ste. Anon. des Chantier et Ateliers de St Nazaire (Penhoet)

CHANTIERS DE NORMANDIE, GRAND QUEVILLY (SNE-INFRE).

† Georgie, cargo boat	Steel	French	—	7,000	4,200ea
† Puerto Rico, mail boat, twin screw	,,	,,	—	6,700	4,500
wm Motricine, oil tanker	,,	,,	—	4,000	1,700
4 Barges	,,	,,	—	360ea	—
WORK ON HAND—					
† 3 Cargo boats	Steel	German	—	8,400ea	4,200
† 1 Cargo boat	,,	French	—	4,000ea	2,400
2 Barges	—	,,	—	400ea	..

Engines by Chantiers de l' Atlantique, St. Nazaire.

Ste. Anon. des Forges et Chantiers de la Mediterranee, Le Havre

† Augo, cargo boat	Steel	French	4,630	7,839	3,750
† Bougainville, cargo boat	,,	,,	not measured		3,750
† Edouard Jeramec, cable layer	,,	,,	,,		1,900
* Dredger, No. 6	,,	,,	—	—	400
WORK ON HAND—					
* Dredger, No. 7	Steel	French	—	—	400
* 3 Steam hoppers	,,	,,	—	—	450ea
† Condé, cargo boat	,,	,,	—	—	3,000
1 Petroleum Lighter	,,	,,	—	—	—

Engines by same Establishment.

Ste. Anon. des Forges et Chantiers de la Mediterranee.

CHANTIERS DE LA SEYNE.

†/ Gallia, packet boat	Steel	French	5,895	14,966	19,000
* Lagane, ferry boat	,,	,,	99	117	200
† Patria, packet bnat	,,	,,	6,500	12,000	9,500
* Lynx, pilotine	,,	Egyptian	—	62	250
WORK ON HAND—					
†/ Massilia, packet boat	Steel	French	5,900	14,980	19,500
* 4 Mine dredgers	,,	,,	—	—	600
† Packet boat	,,	,,	6,500	12,000	9,500
2 Petroleum Lighters	,,	,,	6,500	12,000	9,500
/ Paris, Dreadnought, with turbines	,,	,,	—	—	26,200

Engines by the same Establishment.

Ste. Anon. des Forges et Chantiers de la Mediterranee.

MARSEILLES.

† Theodore Mante, packet boat	Steel	French	not measured		5,200

Ste. Des Ateliers et Chantiers de France, Dunkirk.

† Saint Vincent, cargo	Steel	French	—	5,608	2,600
† Sainte Marguerite, cargo	,,	,,	—	3,098	1,400
† SaintLouis and Saint Michel, cargo	,,	,,	—	5,608ea	2,600ea

WORK ON HAND

Two twin-screw passenger steamers, lengths 510 ft. and 473 ft., will be launched early in 1914.

On order, steamers, aggregating 72,000 gross tons, 45,000 I.H.P.

All engines by same Establishment.

Ste. Anon. des Ateliers et Chantiers de Bretagne, Prairie-au-Duc, Nantes.

† Le Blayet and Sainte Anne, 2 colliers	Steel	French	1,632	3,258	1,900
* 3 Tugs	,,	,,	—	..	700
Magon, torpedo destroyer	,,	,,	—	—	18,000
Rock breaker, No. 2	,,	,,		—	—
WORK ON HAND -					
† Balny, river gunboat	Steel	French	—	—	1,000
† Sainte Jehanne, hltg. hospital	,,	,,	—	—	600
† Elisabeth Marie, stm. trawler	,,	,,	—	—	750
* Tug	,,	,,	—	—	220

All machinery by same Company except Rock Driller.

†/ Triple Expansion and Turbines. wm Werkspoor Motor. * Compound.
t Turbines. † Triple.

Rancelant & Ollivaud, Choisy-le-Roi.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
5 Pontoon cranes	Steel	French	—	552	—
20 Sand boats	,,	,,	965	—	—
3 Petroleum lighters	,,	,,	481	—	—
Hopper	,,	,,	—	97	—
2 Bucket dredgers	,,	,,	—	301	—
1 Barge	,,	,,	176	—	—
1 Lighter, 1 steam launch	,,	,,	—	—	—
5 Smaller boats	,,	,,	169	—	—
WORK ON HAND—					
11 Sand boats	Steel	French	527	—	—
1 Tug, 2 motor boats	,,	,,	236	—	—
3 Barges	,,	,,	176ea	—	—

Schneider & Co., Paris, and Chalon-sur-Saone.

me Submarine, S.D.1.	—	—	—	458	—
t Torp. bt. destroyer	—	—	—	800	—
t Dock barge	—	—	—	600	—
Total 15,800 I.H.P.					
WORK ON HAND—					
me Submarine, SC.4	—	—	—	311	—
me Submarine, SD.2	—	—	—	458	—
me Submarines, SC.5-SC.6	—	—	—	340	—
2 boats	—	—	—	70ea	—

VESSELS ENGINED.

Schneider & Co., Paris, and Chalon-sur-Saone.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
t Commandant Bory, t.b.d.	de Travaux Dyle et Bacalan	—	15,000
t Mangini, t.b.d.	Schneider & Co.	—	15,800
† Porthos, Packet bt.	Chantiers et Ateliers de la Gironde	—	9,000
m Submarines, SD1-SD2	Schneider & Co.	—	9,000
m Submarines, SD3-SD4	Chantiers & Ateliers de la Gironde	—	9,000
m France, mixed cargo	,,	—	1,800
tt Languedoc, Dreadnght.	,,	—	38,000
m Submarine	,,	—	4,800
m 3 Submarines	,,	—	1,300ea

BELGIAN.

The Antwerp Engineering Co., Hoboken-by-Antwerp.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Kohlenheber II., coaling barge	Steel	German	995	1,060	—
† Glenrazan (Isherwood system)	,,	British	2,997	4,026	2,160
† Gotland	,,	German	550	903	650
† Llwyngwair	,,	British	880	1,246	980
† Patetree	,,	,,	879	1,850	1,266
Engines by English firms.					
WORK ON HAND—					
Three Steamers of 4,300, 1,450 and 1,800 gr. tons respectively and two of 760 gr. tons each.					

A. Jabon et Freres, Ombret.

4 Tugs	Steel	French and Belgian	—	—	1,020
16 Other vessels	,,	Various	5,830	—	—

Chantier Maritime de Cruybeke, Cruybeke-lez-Anvers.

16 boats (some fitted with motors)	Steel	Various	2,545	3,204	—
WORK ON HAND—					
7 vessels (some with motors)	Steel	Various	854	1,172	—

GERMAN.

Bremer "Vulcan" Schiffbau und Maschinenfabrik, Vegesack.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Bahia Laura, S.S.	Steel	German	6,172	9,790	4,300
† Pommern, S.S.	,,	,,	4,086	6,556	4,000
† Posen, S.S.	,,	,,	4,094	6,569	4,000
a Tava, S.S.	,,	,,	4,789	7,676	4,900
† Alfhild Paul, S.S.	,,	Norwegian	699	1,195	450
† Mark, S.S.	,,	German	4,090	6,579	4,000
† Pfalz, S.S.	,,	,,	—	6,570	4,000
† Baden and Wurtemberg, S.S.	,,	,,	—	7,580ea	3,700ea

me Petrol and Electric Motors. *t* Turbines. † Triple. *m* Motor.
tt Triple Expansion and Turbines. *a* Quadruple.

Bremer "Vulcan" Schiffbau und Maschinenfabrik, Vegesack.
(Continued.)

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
WORK ON HAND—					
† 2 Steamers, 571, 572	Steel	German	—	6,570ea	4,000ea
† 2 Steamers, 573, 574	,,	,,	—	5,500ea	2,300ea
† 2 Steamers, 575, 576	,,	,,	—	7,580ea	3,700ea
† 2 Steamers, 577, 578	,,	,,	—	18,000ea	11,000ea
a 1 Steamer, 579	,,	,,	—	15,500	9,500
a 2 Steamers, 580, 581	,,	,,	—	5,550ea	3,000ea
† 582	,,	,,	—	8,100	4,400
† Engines only, M253	—	—	—	—	1,950
† Engines only, M254 & 255	—	—	—	—	1,300ea
Engines by same Establishment.					

Deutsche Luxemburgische-Bergwerks und Hutten A. G. "Nordseewerke," Emden.

Emden, pilot schooner	Steel	German	68	126	—
dm M.A.1, tug	,,	,,	—	100	500
9 Caissons for building piers	,,	,,	—	—	—
Two Tug Boats	,,	,,	—	400ea	—
WORK ON HAND—					
2 Caissons for pier building	Steel	—	—	—	—
dm M.A.2, tug	,,	German	—	100	500
† No. 52, tank steamer	,,	,,	—	4,500	1,950
Pontoons for floating crane (Panama)	,,	—	—	—	—
† Cargo steamer	,,	German	—	2,950	1,500
Ferry boat	,,	,,	—	—	—

Flensburger Schiffbau Gesellschaft, Flensburg.

Alrich, S.S.	Steel	German	6,692	—	3,650
Cannstatt, S.S.	,,	,,	5,930	—	4,000
Floating dock	,,	,,	7,750	—	—
Wachtfels, S.S.	,,	,,	5,809	—	2,800
Tasmania, S.S.	,,	,,	7,484	—	4,500
Sumatra, S.S.	,,	,,	7,514	—	4,500
Schneefels, S.S.	,,	,,	5,810	—	2,800
Phœnicia, S.S.	,,	,,	3,560	—	2,200
WORK ON HAND—					
Floating dock	Steel	German	7,750	—	—
Persia, S.S.	,,	,,	3,560	—	2,200
3 Steamers, 337, 339, 345	,,	,,	7,130ea	—	3,600ea
Gera, S.S.	,,	,,	4,750	—	3,000
2 Steamers, 340, 341	,,	,,	6,700ea	—	4,000ea
S.S., 342	,,	,,	7,900	—	3,800
S.S., 343	,,	,,	7,600	—	4,250
S.S., 344	,,	,,	8,000	—	3,600
S.S., 346	,,	,,	6,700	—	3,500
2 Steamers, 347, 348	,,	,,	5,850ea	—	4,000ea

J. Junge, Wewelsfleth b. Gluckstadt.

Emma, cargo steamer	Steel	German	120	—	—
4 Cargo Vessels	,,	,,	55ea	85ea	—
7 Smaller Boats	mostly ,,	,,	total 115	—	—
WORK ON HAND—					
Nos. 215, 216, 217, cargo vessels	Steel	German	55ea	85ea	—
3 Smaller boats	Wood	,,	total 20	—	—

R. Holtz, Harburg and Hamburg.

Steam boat	Steel	German	—	217	648
2 Steam boats	Wood	—	—	27	—
1 Steam boat	Steel	—	—	400	1,456
2 Motor boats	,,	—	—	118 total	324
1 Lighter	,,	—	—	145	—
WORK ON HAND—					
2 steam boats	Steel		total	351	1,545
1 Motor boat	,,	—	—	110	220
Also 1 motor boat (wood) and 6 lifeboats for steamers.					

Henry Koch A.-G., Lubeck.

Tetuan, screw steamer	Steel	German	—	2,229	1,050
Moskau,	,,	,,	—	915	600
Cressida,	,,	,,	—	1,613	800
Valeria,	,,	,,	—	1,617	800
Hornsund, ,,	,,	,,	—	4,802	2,000
Mehedya, ,,	,,	,,	—	533	350
Teneriffa, ,,	,,	,,	—	2,111	1,350
WORK ON HAND—					
No. 222, screw steamer	Steel	German	—	4,800	2,000
Nos. 225, 226, screw steamers	,,	,,	—	2,100ea	1,350ea
Nos. 227, 228, 229, screw steamers	,,	,,	—	1,620ea	800ea
Nos. 230, 231, screw steamers	,,	,,	—	2,100ea	1,400ea

C. Luhring, Hammelwarden, Brake.

2 Barges	Steel	German	278ea	292ea	—
m Gerda, drifter	,,	,,	90	135	40
Emma Taun, schooner	,,	,,	95	121	—
Max, barge	,,	,,	337	368	—
m Friesenland, schooner	,,	,,	200	280	—
2 Barges	,,	,,	380ea	398ea	—
WORK ON HAND—					
4 Barges	Steel	German	380ea	398ea	—
2 Schooners	,,	,,	104ea	136ea	—

† Triple *a* Quadruple. *dm* Diesel Motor. *m* Motor.

Rickmers, Reismuhlen, Rhederei & Schiffsbau A.-G., Bremerhaven.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Peter Rickmers, cargo str.	Steel	German	3,180	5,162	2,500
† Madeleine Rickmers, cargo str.	,,	,,	2,055	3,431	1,800
WORK ON HAND—					
† Building Nos. 166, 167, 168, cargo steamers	Steel	German	3,180ea	5,162ea	2,500ea
Building Nos. 169, 170, cargo steamers	,,	,,	—	5,950ea	2,750ea

D. Ropers, Stade.

Amanda, schooner-yacht ..	Steel	German	—	95	—
WORK ON HAND—					
Building Nos. 115, 116 ..	Steel	German	— total	95	—

Gebr. Sachsenberg A.G., Coln (Deutz).

† Gebr. Dörfelmann l., screw steamer	Iron	German	300	340	800
Floating crane	,,	Russian	725	1,225	—
* Gothe, paddle steamer ..	,,	German	435	635	700
† Steinbux and Elstorl, steam trawlers	,,	,,	450ea	800ea	400ea
† Wasserfahrzeug, screw str.	,,	,,	537	600	600
* Leutnant, pass. and cargo	,,	,,	340	476	500
WORK ON HAND—					
* Bismarck, paddle steamer	Iron	German	405	635	720
† Raal Karcher, screw steamer	,,	,,	300	340	800
7 Smaller vessels	,,	,,	tot. 250	tot. 390	—

Engines by the same Company's Establishment at Rosslau a/Elbe.

Anton Schellenberger, Werth-a-M.

9 Tug boats..	Iron	—	total1,163	—	—
WORK ON HAND—					
1 Motor ship	—	—	325	—	—
3 Tug boats	—	—	tot. 535	—	—

Franz Schenck & Co., Elbing.

Markgraf and Kurfurst, pass. and cargo..	Steel	German	—	—	—
Isolde, lighter	,,	,,	—	—	—
16 Smaller vessels (including 6 pontoons)	,,	,,	—	—	—
WORK ON HAND—					
8 Vessels (small craft) ..	Steel	—	—	—	—

Schiffbau Gesellschaft "Unterweser," Lehe, b. Bremerhaven.

† Martha Niegisch and Grete Trorichs, steam trawlers	Steel	German	70ea	225ea	350ea
* Tank steamer	,,	,,	555	930	450
† Rich. C. Krogmann, Senator Schramm, Max M. Warburg and Loy, steam trs.	,,	,,	70ea	225ea	350ea
Brema, steam trawler ..	,,	,,	70	250	450
Blucher and Vorwarts, steam trawlers	,,	,,	77ea	235ea	350ea
Kornelevator III., boist ..	,,	,,	77	235	350
WORK ON HAND—					
† 4 Fishing steamers	Steel	German	77ea	235ea	350ea
† 3 Fishing steamers	,,	,,	70ea	225ea	350ea
† 1 Fishing steamer	,,	,,	70	250	450
* 1 Herring boat	,,	,,	—	125	80

Engines by same Establishment.

Schiffswerfte und Maschinenfabrik (vorm. Jannsen & Schmilinsky A.G.), Hamburg.

* 7 Tugs	Steel	Germany	— total	370 tot.	1,702
Dekade I., tug	,,	,,	—	108	400
M. G. Amsinck and Otto Schlick, pass. vessels ..	,,	,,	—	115ea	300ea
WORK ON HAND—					
* Kellinghusen, pass.	Steel	German	—	115	300
* 4 Tugs	,,	,,	— total	369	1,442
* No. 544, pass. vessel ..	,,	,,	—	180	290

Engines by same Establishment.

Schiffe und Maschinenbau A. G., Mannheim.

* Sailing and steam tug ..	Steel	German	—	40	85
* Two steam tugs	,,	,,	—	131ea	600ea
* Steam inspection boat ..	,,	,,	—	46	60
Bucket dredger	,,	,,	—	165	110
* 2 steam dredgers	,,	,,	— total	720	tot. 450
WORK ON HAND—					
* 4 Steam tugs	Steel	German	— total	252	180ea
Floating crane	,,	,,	—	184	—
e Police boat	,,	,,	—	12	15

Engines by same Establishment.

† Triple. * Compound. *e* Electric.

Stocks & Kolbe, Kiel.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
dm No. 189, tw.-scr. motor-ship	Steel	Uruguay	295	552	—
Nos. 191, 192, 197, 3 lighters 5 Smaller crafts.	,,	—	tot. 450	—	—
WORK ON HAND—					
* No. 199, mail-boat	Wood	German	—	250	350
dm No. 200, motor-ship ..	Steel	Portugal	—	165	—
No. 206, tank lighter ..	,,	,,	500	—	—
m No. 209, 3-mast schooner..	,,	Brazil	—	180	60

3 Pontoons, 2 motor tugs, 2 steam tugs and tank lighter.

Johs. Thormahlen & Co., Elmshorn.

23 Barges, lighters, etc.	mostly Steel	German	— tot.	2,401	—
WORK ON HAND—					
6 Barges and lighters ..	—	—	— total	683	—

G. H. Thyen, Brake, a d Weser.

2 Hoppers	Steel	German	190 tot.	—	—
WORK ON HAND—					
Helgoland, light ship ..	Steel	German	200	—	—
Sailing lugger	,,	,,	120	—	—
Hopper	,,	,,	40	—	—

Union-Giesserei, Konigberg.

Tank lighter, NCF, No. 6..	Steel	German	—	450	—
† Steam tug	,,	—	—	230	—
5 Other vessels	—	—	— total	115	
WORK ON HAND—					
G. Elias, steam tug	—	German	—	425	—
3 Other vessels	Steel	—	—	—	—

J. H. N. Wickhorst, Hamburg.

† Glucksburg, Lauenburg, Oldenburg, and Oevelgonne, st. trawlers	Steel	German	46ea	230ea	400ea
WORK ON HAND—					
S.S. No. 255	Steel	German	46	230	400
S.S. No. 256	,,	,,	—	200	200
† Nos. 254, 255, stm. trawlers	,,	,,	46ea	230ea	400ea
* Nos. 256, 257, ferry strs. ..	,,	,,	—	200ea	200ea

Engines by same Establishment.

G. Wolkau, Hamburg.

8 Lighters (5 steel and 2 wood)	—	—	— total	592	—
6 Smaller boats	Wood	—	— total	60	—
* 2 Small steam vessels ..	Wood	—	—	15ea	20ea
WORK ON HAND—					
* 2 Ferry steamers	Steel	—	—	120ea	200ea
3 Lighters	,,	—	— total	254	—

Propelling machinery for the steamers by same Establishment.

J. G. Hitzler, Lauenburg (Elbe).

45 Boats (motors, etc.).

WORK ON HAND—

7 Boats.

Atlas-Werke A.G., Bremen and Hamburg.

Hopper barges	Steel	German	—	540	—
Winch lighter	,,	,,	—	—	—
11 Lighters	,,	Foreign	—	685	—
* Steam ferry	,,	German	—	—	80
* 4 Steam tugs	,,	,,	—	—	340
† Inspection steamer	,,	,,	—	—	1,060
† Steam tug	,,	,,	—	189	520
WORK ON HAND—					
2 Lighters	Steel	German	—	600	—
7 Steam tugs	,,	,,	—	—	1,050
† Steamer	,,	,,	—	—	1,700

Machinery by same Establishment.

Howaldtswerke A.G., Kiel.

a Mohawk, Tecumseh, Kiowa and Mohican, oil carrying vessels	Steel	German	—	5,080ea	1,600ea
a Leda, oil carrying vessel ..	,,	,,	—	ab. 7,000	2,800
Nos. 518 and 519, 2 pontoons	,,	,,	—	ab. 720	—
WORK ON HAND—					
a Jupiter, oil carrying vessel	Steel	German	—	ab 10,000	3,500
a No. 583, cargo steamer ..	,,	,,	—	ab. 7,000	3,500
a No. 584, oil carrying vessel	,,	,,	—	ab. 5,080	1,800
† Nos. 585 and 586, cargo strs.	,,	,,	—	ab. 8,000ea	4,500ea
No. 590, battle ship, "T"..	,,	,,	—	—	—

Engines by same Establishment.

J. W. Klawitter, Danzig.

Polijp, dredger	Steel	German	—	234	460
Roland, seagoing tug.. ..	,,	,,	—	248	1,000
No. 379, rail ferry	,,	,,	—	88	—
m No. 380, rail ferry	,,	,,	—	225	60
WORK ON HAND—					
2 Steam tugs	Steel	German		52ea	—
4 Pass. steamers	,,	Turkish	—	350ea	—
Pilot steamer	,,	German	—	180	—

Engines, except No. 380, by same Establishment.

dm Diesel Motor. * Compound. *m* Motor. † Triple. *a* Quadruple.

F. Lemm, Boizenburg.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
5 River boats	Steel	—	—	330 ea	—
1 Lighter	,,	,,	—	115	—
5 Sea lighters	,,	,,	—	250ea	—
8 Smaller vessels	,,	,,	—	340	—
WORK ON HAND—					
9 Sea lighters	Steel			2,052	—
† Pass. and cargo steamer	,,	,,	—	395	200

J. L. Meyer. Papenburg, Hanover.

† Wendemuth and Loemer, 2 tugs	Steel	German		394ea	1,200ea
† Ufohgen, pass. steamer	,,	,,		603	500
11 Tugs and barges	,,	,,	—	473	—
WORK ON HAND—					
5 Tugs, 2 pass. steamers, 3 fishg. boats (herring-lugger)	3 barges	—	2,472	—	2,590

Engines by same Establishment.

Gebr. Sachsenburg A.G., Rosslau-on-Elbe.

25 Vessels, steam tugs, pass. and cargo ships, etc.	Iron	—	ov. 5,735	—
WORK ON HAND—				
19 Vessels, tugs, pass. and cargo boats, etc.	Iron	—	—	—

F. Schichau, Danzig.

König Albert, Dreadnought	Steel	German	—	30,000
Lubzow, large cruiser	,,	,,	—	76,000
Trifon, tank steamer	,,	,,	—	2,400
Columbus, pass. and cargo ves.	,,	,,	—	28,000
WORK ON HAND—				
No. 893/L IX., small crsr.	Steel	—	—	28,000
No. 894/L X., small crsr.	,,	—	—	28,000
No. 913/L XI., Dreadnought	,,	—	—	30,000
No. 929/L XII., pass. and cargo (Hamb. Amer. Co.)	,,	—	—	28,000

Engines by the Company's establishment at Elbing.

F. Schichau, Elbing.

8 Torpedoes	Steel	—	—	— six 14,000ea
				two 6,000ea
Elbing VIII. and Elbing IX., cargo steamers	,,	—	—	800ea
3 Suction dredgers	,,	—	—	1,000ea
6 Other vessels	,,	—	—	total 770
WORK ON HAND—				
6 Torpedo Boats	Steel			22,000ea
3 Suction dredgers	,,			3,200
9 Steam tugs	,,			150ea
1 Barge	,,			—
Pilot steamer	,,			850

Engines by same Establishment.

G. Seebeck A.G., Geestemunde, Bremerhaven.

Mowe, pass. and cargo str.	Steel	German	1,251	—	1,350
Meppen, tank steamer	,,	,,	4,045	—	1,450
Ottensen, Bahrenfeld and Warpfanger, st. trawlers	,,	,,	216ea	—	400ea
Heinr. Rahtjen and Wega, steam trawlers	,,	,,	265ea	—	450ea
WORK ON HAND—					
Ems, tank steamer	Steel	Germany	4,045	—	1,450
Coln, steam trawler	,,	,,	1,400	—	1,450
Cargo steamer, No. 337	,,	,,	1,750	—	1,700
Franz, steam trawler	,,	,,	255	—	400
Tank steamer, No. 341	,,	,,	7,100	—	2,200
9 Steam trawlers	,,	,,	2,223	—	3,780
Cargo and pass. steamer, No. 352	,,	,,	1,250	—	1,350

Engines by same Establishment.

Stettiner Maschinenbau A.G. "Vulcan," Hamburg and Stettin.

	HAMBURG.				
†t Cap Trafalgar, pass. & cargo	Steel	German	—	18,000	16,000
Grosser Kurfurst, battleship	,,	,,	—	—	—
	STETTIN.				
† Frederik VIII., pass. and cargo	,,	Danish	—	11,700	10,000
Tirpitz, pass. and cargo	,,	German	—	21,600	15,600
2 Torpedo boats	,,	,,	—	—	—
6 Torpedo boats	,,	Greek	—	—	—
Königin Luise, pass. str.	,,	German	—	—	—
† Zar Michael Feodorowitsch, ice-breaker	,,	Russian	—	—	—
WORK ON HAND—					
	HAMBURG.				
†t Cap Trafalgar	Steel	German	—	18,000	16,000
Grosser Kurfurst	,,	,,	—	—	—
Building No. 343, battleship	,,	Greek	—	—	—
	STETTIN.				
† Frederik VIII., steamer	,,	Danish	—	11,700	10,000
Tirpitz, steamer	,,	German	—	21,600	15,600
† Lar Michael Feodorowitsch, ice-breaker	,,	Russian	—	2,600	4,500
Nos. 346 to 351, torpedo boats	,,	German	—	—	—
No. 352, Imperial yacht	,,	,,	—	—	—
Nos. 353 & 354, torpedo boats	,,	Dutch	—	—	—
No. 357, cruiser	,,	German	—	—	—

Engines by the same Establishment.

† Triple. †t Triple Expansion and Turbines.

Cæsar Wollheim, Breslau (Cosel).

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† C. W. VI., steam tug	Steel	German	—	abt. 40	150
3 Cargo vessels	,,	,,	—	330ea	—
* No. 400, steam tug	,,	,,	—	abt. 40	—
* Ejurtscha and Perewoloka, steam hoppers	,,	Russian	331ea	628ea	—
Two dredgers	,,	German	—	270	—
† Nienburg and Merseburg, cargo vessels	,,	,,	—	235ea	275ea
m Floating workshop	,,	,,	—	—	8
3 Other vessels	,,	,,	—	119	—
WORK ON HAND—					
Nos. 422, 428-435, 436-442, cargo vessels	Steel	German	—	330ea	—
† 2 Stern-wheel steamers	,,	,,	—	270ea	750ea
2 Steam tugs	,,	,,	—	40ea	150ea
* Dredger	,,	,,	—	—	60

Engines by same Establishment.

Stettiner, Oderwerke, Stettin.

† Grief, cargo and pass. stmr.	Steel	German	—	1,165	1,250
† Phœnix, cargo & pass. stmr.	,,	,,	—	1,166	1,250
† Fink, cargo steamer	,,	,,	—	1,459	700
† Brook, cargo steamer	,,	,,	—	1,514	750
† Andromeda, cargo steamer	,,	,,	—	2,800	1,650
† Bubendez, pass. steamer	,,	,,	—	849	1,300
m Passenger ship	,,	,,	—	78	—
WORK ON HAND—					
† No. 644, pass. steamer	Steel	German	—	abt. 1 700	3,200
† No. 647, cargo steamer	,,	,,	—	1,150	600
† No. 648, cargo steamer	,,	,,	—	1,150	600
† No. 649, cargo steamer	,,	,,	—	1,425	1,000
† No. 650, cargo steamer	,,	,,	—	2,100	950
† No. 651, cargo steamer	,,	,,	—	1,466	700
† No. 653, suction dredger	,,	,,	—	270	500
† No. 654, pass. and cargo	,,	,,	—	1,550	1,500
† No. 655, pass. and cargo	,,	,,	—	720	500
† No. 656, pass. and cargo	,,	,,	—	1 210	1,250
† No. 657, Icebreaker	,,	,,	—	700	1,700

Engines by same Establishment.

J. Ferdinandt, Hamburg.

7 Launches	Steel	German	78	—	129
WORK ON HAND—					
Launch	Steel	—	13	—	—

Joh. C. Tecklenborg, A.-G., Geestemunde.

a Alda, cargo steamer	Steel	German	—	8,000	4 000
† Memphis, Menes and Luxor, cargo steamers	,,	,,	—	9,000ea	4,000ea
† Soltels, Cargo steamer	,,	,,	—	6,700	3,500
† Maryland, pass. & cargo	,,	Danish	—	6,700	3,000
† 2 vessels (engines only)	—	—	—	—	400ea
WORK ON HAND—					
†t S.S. 256, 3-scr. pass. & cargo	Steel	German	—	21,000	15,000
† S.S. 258, cargo steamer	,,	,,	—	5,000	3,500
† S.S. 259, cargo steamer	,,	,,	—	5,000	3,500
† S.S. 261, cargo steamer	,,	,,	—	7,600	4,300
† S.S. 262, cargo steamer	,,	,,	—	9,000	4,300
S. 263, sailing ship with motor	,,	,,	—	1,600	600
† S.S. 264, cargo steamer	,,	,,	—	7,500	4,300
† S.S. 265, cargo steamer	,,	,,	—	7,500	4,300
† S.S. 266, cargo steamer	,,	,,	—	7,000	4,000
† S.S. 267, cargo steamer	,,	,,	—	9,000	4,300
† S.S. 268, cargo steamer	,,	,,	—	7,000	4,000
† S.S. 269, cargo steamer	,,	,,	—	8,000	4,000
† S.S. 270, cargo steamer	,,	,,	—	8,000	4,000

Engines by same Company.

Blohm & Voss, Hamburg.

t Vaterland, Atlantic liner Steel German — —
Derfflinger, Battleship-cruiser for the German Navy.
5 Dock-pontoons for the German Navy.
WORK ON HAND—
t 2 Atlantic liners, Hamburg-American Line.
1 Battleship-cruiser for the German Navy.
2 Oil-motor cargo boats.
1 Floating dock for the German Navy.
1 Triple-screw passenger steamer (combined turbine and reciprocating engine), Hamburg-South-American Line.
1 Floating dock for the Austrian-Hungarian Navy.

VESSELS ENGINED.

Steen & Kautman, Elmshorn.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Es Said and El Maimon, tugs	D. W. Kremer Sohn, Elmshorn	120ea	170ea
† Rugen II., lugger	Wens & Co., Spandau	150	155
† Sabbah, tug	D. W. Kremer Sohn, Elmshorn	75	155
† Lina, tug	,, ,, ,,	150	155
† Naestoed, cargo str.	Frederikshavn's Skibswerft	100	155
3 small vessels	—	—	40ea

†t Triple Expansion and Turbines. *a* Quadruple *t* Turbines. *m* Motor. † Triple. * Compound.

Steen & Kaufman, Elmshorn.
(Continued.)

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
WORK ON HAND			
† Staatssekretar Solf, cargo steamer	Stocks & Kolbe, Kiel	300	170
† Two steamers	Stuhr Talborg	475	319
† Cargo steamer	F. Lemm Boizenbg	200	200

Benz & Cie, Mannheim.

Benz & Cie have supplied during the year 16 Benz motors of a total of 3,965 h.p. for vessels built by various builders, and have on hand 29 motors, total h.p. 6,380.

AUSTRIAN.

Cantiere Navale Triestino, Montalcone.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Ambra and Spuma, cargo vessels	Steel	Austrian		5,355ea	2,500ea
† Belvedere, pass. and cargo	,,	,,		7,200	3,500
† Dora, cargo vessel	,,	,,		6,745	3,000
† Iris, cargo vessel	,,	,,		6,770	3,000
† Pronta, tug and tender	,,	,,	—	260	750
8 Barges, for harbour use	,,	,,	—	720	—

Engines for the Pronta by the same establishment.
WORK ON HAND—
9 Passenger and cargo vessels.
4 Cruisers for Chinese Republic and 4 barges.

Cantiere San Rocco, S.A., Trieste.

a Marienbad, T.S.S., pass. and cargo	Steel	Austrian	4,775	8,448	8,000
† Baron Bruck, pass. stmr.	,,	,,	870	2,085	5,800
† Numidia, cargo boat	,,	,,	3,490	5,391	2,400
† Laguna, cargo boat	,,	,,	3,433	5,417	2,300

Oablonz, sistership to Marienbad, launched 1912, completed and delivered to owners 1913.
WORK ON HAND—

† Hungaria and Innisbruck, T.S.S.'s, pass. and cargo	Steel	Austrian	4,414ea	6,288ea	4,700ea
† Pilsen, T.S.S., pass. and cargo	,,	,	4,750	6,750	5,000
t Cracovia, T.S.S., pass. and cargo	,,	,,	4,750	6,750	4,000 B.H.P.
dm Grado, T.S.S., pass. and cargo	,,	,,	70	165	400 B.H.P.
† Clara Camus, S.S., cargo boat	,,	,,	3,521	5,515	1,800
Crane Pontoon, 20 tns. lift pr.	,,	—	—	—	120

Marco U. Martinolics. Lussinpiccolo.

* Zrmanja and Velebit, pass. and cargo	Steel	Austro-Hung.	52ea	100ea	210ea
† Drava, pass. and cargo	,,	,,	120	200	500
† Kuin, pass. and cargo	,,	,,	160	270	650
dm Thalia, pass. and cargo	,,	German	20	48	100
WORK ON HAND					
2 Barges	Steel	Austro-Hung.	—	280ea	—
† Building, No. 169	,,	,,	—	320	550
3 other vessels	,,	,,	— tot.	300	—

Josef Walter & Co., Schiffwertt, Krischwitz, Tetschen.

4 Tug boats	Iron	Germany	2,176 tot.	—	—
1 Tug boat	,,	Austrian	800	—	—
WORK ON HAND—					
Tug boat, No. 94	Iron	German		—	—

Stabilimento Tecnico Triestino, Trieste.

Tegetthoff, battleship			—	dis.20,000	25,000
Th. 50, torpedo boat			—	dis. 250	5,000
Jo, steam yacht				38	200
Nimrod, Cargo steamer				9,000	2,700
WORK ON HAND—					
Prinz Eugen, Battleship				dis.20,000	25,000
Th.51-Th.57, 7 torpedo-boats				250ea	5,000ea
Floating Crane of 150 tons lifting power				—	—
Pola and Teodo, colliers				7,000ea	6,200ea
San Giorgio, pass. steamer				460	930
Cargo steamer				9,000	2,700
Lighter				200	—

VESSELS ENGINED.

The Breitfeld Danek Engineering Co., Prague.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
t Cruiser Sauda	Cantiere Navale Triestino	25,000	250

† Triple *a* Quadruple. *t* Turbines. *dm* Diesel Motor. * Compound.

HUNGARIAN.

Stabilimento Lazarus, Fiume.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
6 Motor vessels	Steel	Austrian	—	—	250

THE NETHERLANDS.

G. & H. Bodewes Bros., Hoogezand.

Name of Vessel.	Material	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Entrerios, schooner	Steel	German	130	—	—
Elisabeth, schooner	,,	,,	110	—	—
Mathilde, schooner	,,	,,	225	—	—
Grete, schooner	,,	,,	130	—	—
Helene, schooner	,,	,,	130	—	—
Meta Ipland, schooner	,,	,,	450	—	—
Windhuk, schooner	,,	,,	120	—	—
Antilope, schooner	,,	,,	150	—	—
Amazone, schooner	,,	,,	130	—	—
Schniewitlehen, schooner	,,	,,	130	—	—
Cosmopoliet, lighter	,,	Dutch	550	—	—
Heitha, schooner	,,	German	130	—	—
5 Tugs	,,	Various	—	—	1,450
WORK ON HAND—					
Fritz Ipland, 3 m. sch.	Steel	German	450	—	—
Hijronimero Ipland, 3 m. sch.	,,	,,	475	—	—
5 Tugs	,,	Various	—	—	1,250
Lighter	,,	Dutch	450	—	—
Sailing vessel	,,	German	125	—	—

H. H. Bodewes, Millingen.

Henriette, Rhein and canal boat	Steel	German	840	—	—
Alert, Rhein boat	,,	Dutch	1,500	—	—
Moritz and Carnap, Rhein bt.	,,	German	620	—	—
Johanna, Rhein boat	,,	,,	711	—	—
Gebr Heusj, Rhein boat	,,	,,	715	—	—
WORK ON HAND—					
8 Boats for the Rhine	Steel	German	8,490	—	—

P. Boele, Pz., Ridderkerk.

Drughorn 46, lighter	Steel	Dutch	2,106	—	—
Helvetia X., cargo steamer	,,	,,	632	—	—
Ancor, lighter	,,	,,	700	—	—
Drughorn 44, lighter	,,	,,	2,400	—	—
10 Barges, 7 motor (Kromhout) tugs, 2 steam tugs	,,	Various	—	—	—
WORK ON HAND—					
Ewijk, cargo steamer	Steel	Dutch	785	—	—
Meerwijk, cargo steamer	,,	,,	785	—	—
2 Lighters	,,	German	3,770	—	—

Bonn & Mees, Rotterdam.

† Madiven, cargo boat	Steel	Dutch		7,000	4,000
† Marie Therese, stm. trawler	,,	French		260	500
Small craft	—	—	—	250	—
WORK ON HAND—					
† Djember, cargo boat	Steel	Dutch		7,500	4,500
† N. A. S. M. XV., cargo boat	,,	,,		320	150
Tender	,,	,,	—	40	100
† Ferry boat	,,	,,		500	600

Gebrs. Boot, Leyden.

48 Vessels (tugs, barges, etc.)	Steel	—	8,960		
WORK ON HAND—					
30 Vessels (barges, etc.)	Steel	—	8,675		—

N. V. Fortuna, Gorinchem.

Dora, tug boat	Steel	Belgian	330		
2 Lighters	,,	Dutch	200		
2 Hoppers	,,	,,	160		
3 Lighters	,,	,,	270		
m Suction dredger	,,	,,	100		40
4 Dredgers	,,	,,	600		
Floating pontoons (4)	,,	,,	—		
Elevator barges (8)	,,	,,	800		
WORK ON HAND—					
2 Suction dredgers	Steel	Dutch			
3 Steam dredgers	,,	,,			
2 Hopper barges	,,	,,	—		

Gebr. Jonker, Alblasserdam.

13 Lighters	Steel	Various	4,435	D.W.
2 Tank lighters	,,	S. American	900ea	D.W.
* 1 Tug	,,	French	—	
WORK ON HAND—				
1 Dredger and 1 lighter	—			
1 Lighter				

† Triple. *m* Motor. * Compound.

Jonker & Stans, Hendrik ido Ambacht.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
** Fortaleza and Cuijaba, Amazon steamers	Steel	Brazilian	1,150ea	1,498ea	1,200ea
** 3 Tugs	,,	Dutch	—	365	1,250
** Taroudant, Customs boat	,,	Moroccan	—	—	1,500
** Ville de Toulon, dredger	,,	French	—	—	—
WORK ON HAND—					
** 3 Tugs and 1 lighter	Steel	—	—	880	1,450

Gebr. Niestern, Delfzyl.

m Alayde, schooner	Iron	Brazilian	182	237	90
m Hans Stagner, schooner	Steel	German	159	208	90
WORK ON HAND—					
m Myriam Denise, schooner	Steel	French	—	—	90
Cargo boat	,,	Dutch	—	—	12

N. V. Machinefabrik H. J. Koopman, Dordrecht.

† Blankenburg, seagoing tug	Steel	Dutch	—	115	300
* 9 Other tugs	,,	Various	—	410 tot.	1,185
WORK ON HAND—					
7 Tugs	Steel	Various	—	300 tot.	895

Engines by same Establishment.

J. Meyers Shipbuilding Co., Zalt Bommel.

** Venus II., cargo steamer	Steel	Norwegian	—	820	520
m Suction dredger	,,	Dutch	—	90	35
2 Towing hoppers	,,	British	—	290	—
20 Barges	,,	Various	—	6,605	—
WORK ON HAND—					
2 Cargo steamers and several lighters.					

N. V. Werf Zeeland, Hansweert.

Morgenster III.	Steel	Belgian	1,380	—	—
Elizabeth	,,	Dutch	516	—	—
m Administrateur de Badts, pass. and cargo	,,	,,	149	—	470
Alice, pass. and cargo	,,	,,	520	—	—
Scheldestad	,,	Belgian	1,370	—	—
WORK ON HAND—					
3 Vessels	Steel	1 Belgian 2 Holland	3,430	—	—

N. V. Werf v/h Rijkee & Co., Rotterdam.

† Tarakon, tank steamer	Steel	Dutch	—	1,640	1,000
wm London, pass. ship	,,	,,	—	2,000	1,400
WORK ON HAND—					
2 steamers of 4,500 tons gross together.					
2 motor ships of 4,000 tons gross together.					

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

dm 1 Submarine	Steel	Dutch	—	380	2,300
dm 2 Submarines	,,	,,	—	147ea	445ea
† 2 Torpedo boats	,,	,,	—	180ea	3,000ea
† Insulinde, tw. sc. mail boat	,,	,,	—	9,000	7,000
Madiden, cargo steamer	,,	,,	—	—	3,500
M.I. Mandal, cargo steamer	,,	Danish	—	—	1,200
Nederland, cargo steamer	,,	Dutch	—	—	1,000
WORK ON HAND—					
† Tjikembang and Tjisondari, cargo steamers	Steel	Dutch	—	11,300ea	5,000ea
† 2 Torpedo boats	,,	,,	—	310ea	6,000ea
m Submarine	,,	,,	—	227	560
† Djember, cargo steamer	,,	,,	—	—	3,750
† Winterswyk, cargo steamer	,,	,,	—	—	1,500
2 cargo steamers	,,	Danish	—	—	1,100ea
m Brinid, Ironclad	,,	Dutch	—	—	1,200

All triple-expansion engines by same Establishment.

Gebr. Pot, Ridderkerk.

† Recife, pass. steamer	Steel	Brazilian	—	1,102	650
* Doeswijk, Mastwijk and Troostwijk, cargo strs.	,,	Dutch	—	367ea	160
Kura, oil tanker	,,	Belgian	—	628	—
m Tauvette, Colibri, Chardonneret, Linotte, Mésange, Pinson, Rossignol and Reoitelet, cargo boats	,,	German	—	143ea	40ea
Chicago and Panama, Thames barges	,,	British	—	119ea	—
WORK ON HAND—					
m Gallia, oil tanker	Steel	Dutch	—	1,038	320
Lindavia, oil tanker	,,	,,	—	1,281	—
† Nos. 686 and 687, cargo strs.	,,	,,	—	383	165ea
m Lara, oil tanker	,,	England	—	1,011	500
Nos. 698 and 699, cargo and pass. steamers	,,	Dutch	—	—	—
Lighter, pontoon, barges and tug	,,	Various	—	—	—

P. & A. Ruytenburg, Waspik.

Cornelia, tug boat	Steel	Dutch	358	—	—
Clamarant, tug boat	,,	,,	592	—	—
Delfland, tug boat	,,	,,	475	—	—
Frans Gérard, tug boat	,,	Belgian	270	—	—
WORK ON HAND—					
Zeeland (sailer)	Steel	Dutch	320	—	—
Tug boat	,,	Belgian	550	—	—

** Tri-Compound. *m* Motors. † Triple. * Compound.
m Motor. *wm* Werkspoor Motor. *dm* Diesel Motor.

Scheepswerf v.h. Jan Smit, Cz., Alblasserdam.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Gelderland	Steel	Dutch	—	1,877	1,200
† M. I. Mandal	,,	Danish	—	1,886	1,100
† Nederland	,,	Dutch	—	1,832	1,200
WORK ON HAND—					
† Winterswijk	Steel	Dutch	—	3,100	1,500
† No. 475	,,	Danish	—	1,950	1,200
† No. 476	,,	Dutch	—	1,500	1,200

Machinefabriek Delfshaven, Rotterdam.

*† 10 Tugs and 1 ice-breaker	Steel	Foreign	—	322	1,369
WORK ON HAND—					
*† 4 Vessels	Steel	Dutch	—	205	350

Engines by same Company.

D. Goedkoop, Jr., Amsterdam.

20 Launches, tugs, etc.	Wood & Steel	Various	774	—	1,564
WORK ON HAND—					
11 Launches, tugs, etc.	Wood & Steel	Various	102	—	652

All Kromhout motors.

J. & K. Smits Scheepswerven, Kinderdijk.

* Beverwijk XVI., buck. drgr.	Steel	Dutch	303	394	300
† Beverwijk IX., barge-unloading dredger	,,	,,	352	424	900
Sliedrecht VI., barge unloading dredger	,,	,,	—	500	1,200
Schelde, bucket dredger	,,	,,	—	400	400
* Goridonia, cutter suction dr.	,,	British	232	259	400
Deyffel and Roozand, bucket dredgers	,,	Dutch	219ea	289ea	300ea
Hercules I., floating crane	,,	,,	—	—	—
No. 663, pontoon	,,	,,	—	—	—
No. 665	,,	,,	—	—	—
WORK ON HAND—					
† Barge unloading dredger	Steel	French	—	500	1,200
† Witte Zee, tug boat	,,	Dutch	—	550	1,000
† Kil, bucket dredger	,,	,,	—	400	350
† Sliedrecht VII., cutter suction dredger	,,	,,	—	510	1,200
† No. 664, suction dredger	,,	,,	—	270	550
† Nos. 666 and 667, pass. strs.	,,	,,	—	660ea	1,000ea
* Bucket dredger	,,	,,	—	350	100

C. Van der Giessen & Zonen, Stormpolder.

1 Rhine lighter	Steel	Germany	1,650	—	—
1 Rhine lighter	,,	Dutch	3,000	—	—
1 Rhine lighter	,,	,,	2,600	—	—
6 Rhine lighters	,,	,,	9,250	—	—
1 Crane lighter	,,	,,	600	—	—
5 Crane pontoon lighters	,,	,,	1,250	—	—
3 Pontoon lighters	,,	,,	300	—	—
2 Coal lighters	,,	,,	240	—	—
1 Pontoon for floating crane	,,	,,	625	—	—
* 1 Pass. steamer	,,	,,	85	150	93
* 1 Cargo steamer	,,	,,	190	100	85
1 Suction dredger	,,	,,	660	—	—
WORK ON HAND—					
2 Rhine lighters	Steel	Dutch	6,000	—	—
2 Crane pontoon lighters	,,	,,	500	—	—
1 Coaling elevator	,,	,,	520	—	—
1 Rhine lighter	,,	,,	1,130	—	—

Van Vliet & Co., Hardinxveld.

Cjefion, cargo steamer	Steel	English	290	622	—
Blush Rose, cargo steamer	,,	,,	282	645	—
Monte Leono, river lighter	,,	Belgian	—	1,500	—
Justina Alida, river lighter	,,	Dutch	—	550	—
Guelder Rose, cargo str.	,,	English	314	692	—
Amiral L'Hermite, cargo str.	,,	,,	121	334	—
WORK ON HAND—					
Fishing cutter	Steel	Dutch	—	90	—
Cargo steamer	,,	English	314	692	—
1 River lighter	,,	German	—	1,500	—
6 River lighters	,,	Dutch	—	1,500ea	—

Werf Gusto (A. F. Smulders) Schiedam.

* 150-tons floating crane	—	Foreign	—	1,100	480
* 400-tons floating crane	—	,,	—	2,100	1,200
* Bucket dredger	—	,,	—	280	200
* Sand suction dredger	—	,,	—	450	1,300
* Bucket dredger	—	,,	—	530	650
* Blue metal conveyor	—	,,	—	525	550
* 60-tons crane	—	,,	—	360	55
* 100-tons crane	—	,,	—	540	55
3 Dumb barges	—	,,	—	970	—
8 Tilting self-dumping barges	—	,,	—	2,000	—
15 Gusto Diesel motors	—	,,	—	—	2,700 B.H.P.
WORK ON HAND—					
* 150-tons floating crane	—	Foreign	—	2,100	950
* Sand suction dredge	—	,,	—	150	150
† 2 Sand suction dredges	—	,,	—	1,850	3,500
3 Coaling vessels	—	,,	—	3,656	1,900
* Bucket dredger	—	,,	—	500	450
* 20-tons crane	—	,,	—	220	35
* 3 Stone carrying barges	—	,,	—	2,610	1,800
8 Gusto Diesel motors	—	,,	—	—	1,590 B.H.P.

† Triple. * Compound. *† Triple-Compound.

Werf de Noord, Alblasserdam.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
4 Rhine barges	Steel	Dutch	1,019ea	—	—
sg Zeearend, motor boat	„	„	242	462	—
WORK ON HAND—					
3 Rhine barges	Steel	Dutch	1,000ea	—	—
2 Rhine barges	„	„	3,000ea	—	—

Willon's Engineering and Slipway Co., Rotterdam.

* 7 Elevators	Steel	Belgian	520	840	300
Bergen, motor boat	„	Dutch	12	—	40
* Wilis I., II., III., 3 dredgers	„	„	100ea	—	170ea
* Singaradja and Singkel, cargo and pass.	„	„	300ea	615ea	375ea
Engines built in addition	—	—	—	—	1,200
Boilers built (10), heating surface 11,310 ft.					
WORK ON HAND—					
* 4 Dredgers	Steel	Various	760	2,700	3,580
* 4 Elevators	„	Belgian	260ea	400ea	300ea
Engines for passenger and cargo boats and dredgers by same establishment.					
Boilers (22), heating surface 27,072 ft.					

Gebr. Zwolsman, Vlst.

* Schiermounikoog, pass. vessel twin-screw	Steel	Dutch	100		
Spessalutis, lighter	„	„	250		
* Workum, schooner	„	„	160	—	—
* 11 Motor boats, yachts, etc.	„	Various	370		
WORK ON HAND—					
6 Motor boats and 1 tug	Steel	Dutch	275	—	—

Worfelboer & Co., Hoogezand.

6 Vessels (lighters, etc.)	Steel	Various	—	2,630	
WORK ON HAND—					
6 Vessels (lighters, etc.)	Steel	Various		3,630	—

Maatschappij voor Scheeps-en Werktingbouw, "Fijenoord," Rotterdam.

a Zon Emma, twin-screw, pass. and cargo	Steel	Dutch	6,180	9,180	7,'00
† Melchior Treut, pass. and cargo,,	„	„	950	3,458	4,300
† Van Gamberge, pass. str.	„	„	1,800	1,916	1,350
† Tarakan (engines and boilers only), tank steamer	„	„		—	1,150
† Media, (engines and boilers only), cargo boat	„	„		—	1,100
WORK ON HAND—					
† Vos and Panter, torpedo-boat destroyers	Steel	Dutch		dis.428ea	8,500ea
† G15, G16, torpedo boats	„	„		dis.175ea	3,000ea
† 4 Pass. steamers, Van den Beele, Van Rees, Van Imhoff, Pynacker, Hoedyk	„	„		3,000ea	1,660ea
† Texelstroom, Orion and Deucalion (engines only), cargo boats	„	„	1,860	2,440	1,200ea
† Suction dredger	„	„	—	dis.725	900
† Roggeveen, pass. steamer	„	„	4,115	4,725	3,150
† 2 Torpedo boats	„	„	—	dis.310	5,500ea
1 Cargo boat and 1 submarine (engines only), 180 H.P.					
Engines by same Establishment.					

Nederlandsche Scheepsbouw Maatschappij, Amsterdam.

a Prins du Nederland, mail str.	Steel	Dutch	9,200	26
m Ares and Artemis, oil-carriers	„	„	4,500ea	850ea
No. 11, 14,000 tons lifting power dry dock	„	„	—	—
No. 129, 4,000 tons lifting power, suction of dry dock	„	„	—	—
WORK ON HAND—				
† Rotti, cargo steamer	Steel	Dutch	7,700	5,150
† Jan Pietersz Coen, mail str.	„	„	11,000	3,000
† Nos. 132, 133, mail strs.	„	„	5,000ea	3,350ea
† Barentor, cargo and pass. st.	„	„	4,500	3,150
No. 131, dredger	„	„	—	—

W. F. Sloel & Zoon, Alkmaar.

m 24 Vessels (motor boats, etc.)	Steel	—	314	—
WORK ON HAND—				
m 9 Vessels (motor boats, etc.)	Steel		109	—

Werf Conrad, Haarlem.

† Hopper suction dredger	Steel	Argentine	3,000	2,600
* Suction dredger	„	Brazilian	320	600
e Beton vessel	„	„	195	—
† Hopper suction dredger	„	Russia	800	300
† Crane	„	Argentine	1,750	500
* 4 Tin dredgers	„	Dutch (One English)	1,650	900
* Cutter suction dredger	„	Brazilian	150	140
WORK ON HAND				
* No. 469, cargo steamer	Steel	Nederland	493	500
† No. 470, hopper	„	Argentine	190	150
* No. 471, dredger (bucket)	„	Dutch	400	250
† No. 472, dredger (bucket)	„	Russian	450	450
† No. 473, hopper suction dr.	„	„	230	200
† No. 474, hopper dredger	„	„	230	200
Engines by same Company.				

* Compound. m Motor a Quadruple. † Triple.
e Electric. sg Suction Gas.

Burgerhout's Engineering & Shipbuilding Works, Ltd., Rotterdam.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
6 Tugboats	Steel	Various	668	—	1,563
Lighter	„	S. Amer.	54	—	—
Hopper barge	„	British	335	—	—
m Shallow draught vessel	„	Belgian	72	—	2 × 70 b.h.p.
2 Grain elevators	„	Dutch	—	—	—
WORK ON HAND—					
3 Tug boats	Steel	Various	522	—	1,370
Cargo steamer	„	Belgian	426	—	420
Passenger steamer	„	Dutch	160	—	135
2 Grain elevators	„	British & Dutch	—	—	—
Engines and boilers by same Establishment.					

Arnhemsche Stoomsleephelling Mij., Arnhem.

17 Vessels (tugs, etc.)	Steel	—	—	1,250	3,535
14 engined by same Company.					
WORK ON HAND—					
8 vessels with engines	—	—	—	1,176	1,610
5 engines for new vessels	—	—	—	—	1,025
1 engine for old vessel	—	—	—	—	200

VESSELS ENGINED.

Alblasserdamsche Machinefabrik, Alblasserdam.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† 17 Vessels	Various	8,500	—
* 4 Vessels	„	820	—
WORK ON HAND—			
† 5 Vessels	Various	2,700	—

Netherlands Engineering Co,. Amsterdam.

† Van Neck	Ned. Scheepsbouw Mij.	1,400	180
† Houtman	„ „	3,400	180
a Prins der Nederlanden	„ „	2 × 3,000	210
m Emanuel Nobel	„ „	2 × 1,400	—
m Loudon	Rijkee Rotterdam	1,400	—
m Friso	Marine werf A'dam	2 × 775	—
m Artemis	Ned. Scheepsb. M.	2 × 1,100	—
WORK ON HAND—			
† Rotti	Ned. Scheepsb. Maatschij.	5,150	210
† Jan Pieterszoon Coen	„ „ „	2 × 3,500	216
† 2 Mast steamers	„ „ „	3,200ea	180
† Barentsz	„ „ „	3,150	180
m Ares	„ „ „	2 × 1,100	—
m Selene	Caledon Shipbuilding Co.	2 × 1,100	—
m Hermes	Palmers Co.	2 × 1,100	—
m Elbrus	Tyne Ironworks	2 × 1,400	—
m Jules Henry	Existing Sailing Ship	2 × 660	—
m Poseidon	Smith's Dock Co.	450	—
m Belskeningsvaarting	Marine N.O.T.	450	—
m Limburg	Existing Tank Ship	450	—
m Myer and Liberg	Rijkee Rotterdam	1,400ea	—
m 3 vessels (one named Lara)	Gebr. Pot. Bolnes	675ea	—

Maschinenfabrik "Fulton," Hoogezand.

9 Tug boats		2,100	—
WORK ON HAND—			
Machinery for 7 tugs.			

Gebs. Stork & Co., Hengelo.

† Engines (4 vessels)		670ea	160ea
* Engines (9 vessels)		1,170	—
WORK ON HAND—			
†* 9 vessels, total 2,250 I.H.P.			

Kinderdijk Machinefabrik, Kinderdijk.

* Beverwijk XVI., bucket dredger	J. & K. Smits, Scheepswerven	300	150
† Beverwijk IX., suction dredger	„ „	900	180
† Sliedrecht VI., suction dredger	„ „ „	1,200	180
† Schelde, bucket dredger	„ „ „	400	180
* Posidonia, cutter suction dredger	„ „ „	400	120
* Leyffel and Roozand, 2 bucket dredgers	„ „ „	300ea	120ea
WORK ON HAND—			
† Suction dredger	J. & K. Smits, Scheepswerven	1,300	180
† Witte Zee, tug boat	„ „ „	1,000	165
† Kil, bucket dredger	„ „ „	400	180
† Sliedrecht VII., cutter suction dredger	„ „ „	1,200	180
† 2 Passenger steamers	„ „ „	1,000ea	180ea
* Bucket dredger	„ „ „	100	120

m Motor. † Triple * Compound. a Quadruple. †* Triple Compound.

Lohnis & Co., Rotterdam.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Twee Provincien IV., pass. river steamer..	C. v.d. Giessen & Zonen		135		120
v* Portunis, pass. river st.	,, ,, ...		160		132
v* Suction dredger ..	J. & K. Smits, Scheepswerven		470		117
v* Petrus, cargo river str.	C. v.d. Giessen & Zonen		100		120
‡ Hercules III., floating crane..	J. & K. Smit's, Scheepswerven		—		88
Boilers for 6 other vessels.					
WORK ON HAND—					
v* Ewijk, cargo river str.	Boele & Pot		2 × 175		117
v* Meerwijk, cargo river st.	,, ,, ...		2 × 175		117
Nieuwpoort III., suction dredger	J. & K. Smits, Scheepswerven		600		170

NORWEGIAN.

Framnaes Mek. Værksted, Sandefjord.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr.Tns.	I.H.P.
WORK ON HAND—					
† 1 Freighter	Steel	Swedish	380	720	abt. 550

A/S Fredriksstad Mek. Værksted and A/S Sorlandets Skibsbyggeri, Fredriksstad.

† Skrymer, cargo steamer	Steel	Norwegian	880	1,476	1,200
† Regin, cargo steamer..	,,	,,	1,107	1,844	1,450
† Brager, cargo steamer .	,,	,,	1,109	1,830	1,450
† Heimland I., cargo steamer	,,	,,	269	506	380
† Heimland II., cargo steamer	,,	,,	270	507	380
† Libra, cargo steamer ..	,,	,,	1,110	1,839	1,450
† Laalefos, cargo steamer ..	,,	,,	865	1,458	1,200
† Oria, cargo steamer	,,	,,	1,108	1,846	1,400
† Völund and Nils, cargo strs.	,,	,,	1,114ea	1,847ea	1,450ea
† 5 Lighters	,,	,,	—	500	—
WORK ON HAND—					
dm 1 Motor, cargo ship ..	Steel	Norwegian	2,380	3,360	2,300
† 10 Cargo steamers	,,	,,	1,114ea	1,847ea	1,450ea
† 3 Cargo steamers	,,	Swedish	1,120ea	1,860ea	1,200ea
† 2 Cargo steamers	,,	,,	880ea	1,480ea	1,100ea
† 1 Cargo steamer ..	,,	Norwegian	1,120	1,860	1,200
† Hopper barge	,,	,,	—	100	

All engines by A/S Fredriksstad Mek. Værksted.

Trondhjems Mek. Værksted, Trondhjem.

† Roald Jarl, cargo	Steel	Norwegian	810	1,400	980
† Vivat, cargo ..	,,	,,	646	1,092	750
† Arnfin Jarl, cargo ..	,,	,,	649	1,097	700
† Consul Bratt, cargo .	,,	Swedish	623	1,116	750
WORK ON HAND—			about	about	about
† 2 Cargo vessels	Steel	Norwegian	651ea	1,125ea	750ea
† Passenger and cargo vessel	,,	,,	400	700	1,100
† Cargo vessel	,,	Swedish	580	1,070	750
† 2 Cargo vessels	,,	Norwegian	646ea	1,092ea	750ea
† 2 Cargo vessels	,,	,,	651ea	1,125ea	750ea
† Passenger and cargo vessel	,,	,,	200	350	450

Engines by same Establishment.

Kristianssands Mek. Værksted A.S., Kristianssand.

† 2 Whalers	Steel	Norwegian	—	} 881	566ea
2 Pass. boats (one † one *)	,,	,,	—		389
† 2 Fishing smacks	,,	,,	—		232ea
WORK ON HAND—					
† 4 Fishing smacks	Steel	Norwegian	50ea	150ea	230ea

All engines, except the whalers, by same Establishment.

Marstal Staalskibsbyggeri & Reparations Værft, Marstal.

m Tvöroyri, schooner	Steel	Danish	130	182	60
WORK ON HAND—					
m Motor vessel	Steel	Danish	—	20	40

A/S Mjellem & Karlsen, Bergen.

† Seimstrand and Austrheim, passenger steamers.. ..	Steel	Norwegian	51ea	119ea	250ea
† Normanden and Tampen, fishing boats	,,	,,	60ea	153ea	—
WORK ON HAND					
† Passenger steamer	Steel	Norwegian	ab.350	190	420
* Tug boat	,,	,,	ab. 40	90	300
† Passenger steamer	,,	,,	ab. 50	120	250

Engines by same Establishment.

A/S Moss Værtt, Moss.

† Bygdo, cargo steamer ..	Steel	Norwegian	323	720	750
* Tujgoe, cargo steamer ..	,,	Swedish		320	300
† Hekkingen	,,	Norwegian		177	400
* Traghemand 3, cargo steamer	,,	,,	85	211	175
WORK ON HAND—					
2 Cargo steamers	Steel	Norwegian	660ea	1,100ea	850ea

Engines by same Establishment.

*v** Vertical Compound, ‡ High Pressure. †*m* Triple Expansion and Motor. *dm* Diesel Motor. *m* Motor. * Compound.

Orens Mek. Værksted, Trondhjem.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
* Engines for an old boat ..	—	—	—	—	50
WORK ON HAND —					
Repairs only.					

Pusnaes Stoberi & Mek. Værksted, Arendal.

* Kraft, tug and ice-breaker	Steel	Norwegian	14	55	180
Grete, seagoing lighter ..	,,	,,	215	225	—
2 Coasting lighters	,,	,,	—	150ea	—
1 Coaster lighter..	Wood	,,	—	140	—
WORK ON HAND—					
2 Coasting lighters	Steel	—	—	170ea	—
* Passenger steamer, No. 33	,,			—	125
* Tug and ice-breaker, No. 34	,,			55	160
2 Small hopper barges ..	,,	—	—	—	—

Engines for Nos. 33 and 34 by same Establishment.

Porsgrunds Mek. Værksted, Porsgrund.

† Ghbberbind, cargo vessel ..	Steel	Norway	376	717	500
† Villemoes, cargo vessel ..	,,	Denmark	395	750	—
WORK ON HAND—					
dm No. 73, cargo vessel ..	Steel	Norway	350	650	400
† No. 74, cargo and pass. ..	,,	British	600	1,000	650

All engines, except No. 73, by same Establishment.

Rosenbergs Mek. Værksted, Stavanger.

WORK ON HAND—					
dm Sueklokken and Blaaklokken, cargo vessels	Steel	Norwegian	—	abt. 350ea	300ea

Akers Mek. Værksted, Christiania.

† Vale, single screw	Steel	Norwegian		719	600
† Formosa, single screw ..	,,	,,		137	500
† Knysna and Zitzekama, single screw	,,	,,		137ea	450ea
† Bitou and Pisang, single scr.	,,	,,		116ea	400ea
† Goukama, single screw ..	,,	,,		137	450
† Nico, single screw	,,	,,		712	600
† Rutil, single screw	,,	,,		706	600
† Speed, single screw	,,	,,		707	600
† Lofoten, single screw ..	,,	,,		942	600
* Sterkenils, single screw ..	,,	,,		171	200
† Ranheim, single screw ..	,,	,,		329	350
† Sundal, single screw ..	,,	,,		90	140
† Aafjord, single screw ..	,,	,,		300	430
† Sturmvogel, single screw	,,	German		159	500
† Seeadler, single screw ..	,,	,,		159	500
† Hercegovina, single screw..	,,	,,		663	600
WORK ON HAND—					
m No. 362	Steel	Norwegian		2,200	1,500
†*m* No. 365	,,	,,		1,000	850
m No. 366	,,	,,		2,600	1,500
† No. 369	,,	,,		275	450
† No. 371	,,	,,		700	600
† No. 372	,,	,,		1,100	850
† No. 373	,,	,,		800	825
† No. 374	,,	,,		550	500
† No. 375	,,	,,		1,100	850
† No. 376	,,	,,		1,050	850
† Nos. 377 and 378	,,	,,		400ea	700ea
† No. 671 (engine only) ..	—	—		—	550

Engines by same Establishment.

Stavanger Stoberi & Dok, Stavanger.

† Gansfjord	Steel	Norwegian		1,087	1,100
† Kristiansand	,,	,,	—	ab. 460	650
WORK ON HAND—					
† No. 70, awning deck ..	Steel	Norwegian	—	ab. 570	850
† No. 71, flush deck	,,	,,	—	ab. 1,087	1,100

Engines by same Establishment.

Nylands Værksted, Christiania.

† Banan, cargo steamer ..	Steel	Norwegian	948	1,620	1,500
† Kong Ring, pass. and cargo st.	,,	,,	996	1,611	1,500
† Granfos, cargo steamer ..	,,	,,	890	1,461	1,000
† Balzac, cargo steamer ..	,,	,,	999	1,720	1,000
† Borgsten, cargo steamer ..	,,	,,	999	1,719	1,000
† Athos, cargo steamer.. ..	,,	,,	999	1,708	1,000
WORK ON HAND—					
† 8 Cargo steamers, Nos. 237 to 244	Steel	Norwegian	total abt. 7,274	total abt. 12,210	total abt. 7,600

Engines by same Establishment.

Bergens, Mek. Værksted, Bergen.

† Vesla, cargo.. .	Steel	Norwegian	663	1,108	750
† Recto, cargo ..	,,	,,	670	1,115	750
† John Bakke, cargo ..	,,	,,	950	1,611	990
† Forsvik, cargo	,,	Swedish	659	1,100	750
WORK ON HAND					
† 7 Vessels, cargo	Steel	Norwegian	4,526	9,193	6,270
† 2 Engines only	—	—	—	—	800

Engines by same Establishment.

* Compound. † Triple. *dm* Diesel Motor. *m* Motor. †*m* Triple Motor.

SWEDISH.

Motala Verkstads Nya. A.B., Motala.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
• 4 Tug boats	Steel	Russian & Swedish	175	—	550
m 3 Barges	„	Swedish	—	—	—
WORK ON HAND—					
• Steam ferry, passenger	Steel	Russian	—	—	125
3 Tug boats	„	„	—	—	1,400

Engines by same Company.

Eriksbergs Mek. Verkstad A.B., Gothenburg.

‡‡Louise, cargo steamer	Steel	Danish		262	120
j Kind, passenger steamer	„	Swedish		60	90
‡‡Ewy, cargo steamer	„	„	—	250	120
Semo I., oil tank vessel	„	„	—	70	30E.H.P.
2 Dredging barges	„	„	—	200	—
WORK ON HAND—					
††No. 166, passenger steamer	Steel	Swedish		370	700
‡‡No. 171, cargo steamer	„	„	—	250	150
No. 172, passenger steamer	„	Finnish	—	370	500

Engines, except for oil tanker, by same Establishment.

Helsingborgs Varfs A.B., Helsingborg.

† Romulus, S.S.	Steel	Norwegian	465	819	450
WORK ON HAND—					
• Yard, No. 35	Steel	Swedish	abt. 346	abt. 660	400

Engines by same Establishment.

Lindholmens Verkstads A.B., Gothenburg.

† Vega	Steel	Swedish	—	1,094	550
† Ariadne	„	„	—	3,000	3,000
• Birgit	„	„	—	252	125
† Nimer	„	„	—	975	900
† Mjolnor	„	„	—	975	900
† S.S. 417	„	„	—	2,000	1,350
WORK ON HAND—					
† No. 418, S.S.	Steel	Swedish	—	2,000	1,350
† No. 419, ferry boat	„	„	—	300	300
† No. 420, S.S.	„	German	—	1,000	820

Also part of battleship Sverigo.

Engines by same Establishment.

Lundby Mek. Verkstad A.B., Goteborg.

‡‡3 Tug boats	Steel	Russian & Swedish	—	—	550
WORK ON HAND—					
‡‡Tug boat	Steel	Swedish	—	—	200
j 2 Canal steamers (engines only)	—	„	120ea	315ea	110ea

Engines by same Establishment.

Oskarshamms Mek. Verkstads och Skeppodockas A.B., Oskarshamm.

† Oscarsborg, cargo steamer	Steel	Swedish	—	1,214	800
† Wasaborg, cargo steamer	„	„	—	1,388	800
† Orvar, cargo steamer	„	„	—	ab. 1,600	1,000
WORK ON HAND—					
† Cargo steamer, No. 248	Steel	Swedish		550	400
† Cargo steamer, No. 249	„	„	—	1,200	800
• Tug boat, No. 250	„	„	—	40	125
† Pass. and cargo steamer, No. 251	„	„	—	1,500	1,250

Engines by same Establishment.

Goteborgs Nya Verkstads A.B. (Yard Gotaverken), Goteborg.

† Abisko, cargo	Steel	Swedish	1,640	3,090	1,100
m Ljusne Jernverk, schr.	„	„	236	477	250
† Inspection steamer	„	Russian	—	550	650
WORK ON HAND—					
Sverige, Battleship	—	Swed. Gov.	—	—	—
m Oil Tanker	Steel	Russian	—	5,000ab	4,000
Cargo steamer	„	Swedish	—	550	350

Engines, with exception of motor vessels, by same Company.

DANISH

Copenhagen Floating Dock and Shipworks, Ltd., Copenhagen.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
6 Lighters	Steel	Danish	—	—	—
• Sand pump dredger	„	„	67	192	172
• Tug boat	„	„	3	45	95
Dock, No. III., lifting power 4,000 tons	„	„	—	—	—
† Cargo steamer	„	„	785	1,301	700
† Wm. Th. Malling, cargo str.	„	„	ab.1,075	ab.1,880	1,000
WORK ON HAND					
† Malmo, passenger steamer	Steel	Danish	ab.250	ab.670	1,200
• No. 116, passenger steamer		–	ab.50	ab.115	250
No. 119, coalg. transptr.		Norwegian	ab.25	ab.90	—
† No. 120, cargo steamer		Danish	ab.725	ab.1,225	470
† No. 121, cargo steamer	„	„	ab.660	ab.1,170	480
† No. 122, cargo steamer	„	„	ab.495	ab.895	450

Engines by same Establishment.

‡‡ Compound Surface Condensing. †† Triple Surface Condensing.
† Triple. *m* Motor. • Compound. *j* Jet Condensing.

Helsingors Jernskibs & Maskinbyggeri, Elsinore.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† S.S. Romny, cargo steamer	Steel	Danish	—	1,023	800
• Sejro, salvage and tug boat	„	„	—	129	450
† S.S. A. P. Bernstorff, cargo and passenger steamer	„	„	—	2,315	3,300
† S.S. Charkow, cargo steamer	„	„	—	1,023	800
† S.S. Rodfaxi, cargo steamer	„	„	—	1,658	700
WORK ON HAND—					
† No. 143, cargo steamer	Steel	Danish	—	ab.1,475	700
† No. 144, cargo and pass. str.	„	„	—	ab.2,500	1,500
† No. 145, cargo steamer	„	„	—	ab.1,100	480
• No. 197 (engines only)	—	—	—	—	125
• No. 198 (engine only)	—	—	—	—	500

Engines by same Establishment.

P. Ph. Stuhrs Maskin & Skibs, Aalborg.

m Zeus Rüs, motor ship	Steel	Danish	98	137	80
m Alpha, motor ship	„	„	—	99	70
• Nogil, cargo steamer	„	„	—	abt. 200	200
• T. P. Petersen, pass. str.	„	„	—	abt. 270	330

Burmeister & Wain, Copenhagen.

dm Siam, cargo	Steel	Danish	3,311	5,296	3,000
dm Annam, cargo	„	„	3,325	5,296	3,000
dm Pedro Christoffersen, cargo	„	Swedish	2,238	3 725	2 000
dm California, cargo	„	Danish	2,854	4,597	2,700
dm Fionda, cargo and pass.	„	„	3,337	5,219	4,000
dm Kronprins Gustaf Adolf, cargo	„	Swedish	2,238	3,730	2,000
WORK ON HAND—					
dm No. 290, cargo	Steel	Swedish	—	3,730	2,000
† No. 292, passenger	„	Danish	—	900	1 000
dm No. 294, cargo	„	„	—	5,150	3,000
dm No. 295, cargo	„	„	—	5,150	3,000
† No. 296, passenger	„	„	—	1,450	1,750
dm Nos. 297 and 298, cargo	„	Swedish	—	3,730	2,000
dm Nos. 299 and 300, cargo	„	Danish	—	5,150	3,000

Engines by same Company.

RUSSIAN.

Th. Eales & Son, St. Petersburg.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Dwa Crata, tug boat	Iron	Russian	40	—	130
Otez, tug boat	„	„	78	—	200
Pumeaoff, tw.-scr., tug bt.	„	„	120	—	250
Silni, tw.-scr., tug boat	„	„	190	—	450
WORK ON HAND—					
4 Tug boats, S.S.	Iron	Russian	tot. 200	—	120ea

FINNISH.

Maskin & Brobyggnads A.B., Helsingfors.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
• Ingenieur Wurzel, tunnel propeller	Steel	Russian	—	210	100
• Helsingfors Stads Mudderverk, dredger	„	„	—	190	125
1 Tug and 1 lighter	„	„	—	tot. 115	—
† Iwan, st. wheel str.	„	„	—	950	650
• Graf Kamenskij, ice breaker	„	„	—	110	220
WORK ON HAND—					
• 2 Stern wheel steamers	Steel	Russian	—	300	100
9 Lighters	„	„	—	500	—
Barge	„	„	—	55	—
• Steam ferry	„	„	—	25	65

Engines by same Establishment.

Alla Maskinfabriken, Helsingfors.

17 Motor boats, etc.	Wood	Russn. & Swed.	—	—	490

Engines by same Establishment.

ITALIAN.

G. Benetti (through Amerigo Gori, Leghorn).

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
4 Schooners	Wood	Italian	—	1,069	—
WORK ON HAND—					
3 Schooners	Wood	Italian	—	675	—

Fortunato Celli (through Amerigo Gori, Leghorn).

WORK ON HAND—					
2 Schooners	Wood	Italian	—	581	—

Antonio Codecasa (through Amerigo Gori, Leghorn).

2 Schooners	Wood	Italian	—	421	—
WORK ON HAND—					
2 Schooners	Wood	Italian	—	438	—

m Motor. • Compound. † Triple. *dm* Diesel Motor.

Fiat San Giorgio, Spezia.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Milano, pass. ship	Steel	Italian	2,495	4,151	4,000
† Clara, cargo boat	,,	,,	4,139	5,502	—
m F.1, submarine	,,	Brazilian	253 surface 305 submerged		2,500 600 B.H.P.
m Jalea, submarine	,,	Italian	249 surface 304 submerged		600 B.H.P.
m F.3, submarine	,,	Brazilian	253 surface 305 submerged		600 B.H.P.
WORK ON HAND—					
† No. 77, cargo boat	Steel	Italian	4,139	5,502	2,500
m No. 78, submarine dock	,,	Brazilian	2,000	3,500	4,000 B.H.P.
m F.5 and 43, 2 submarines	,,	,,	ea253 surface ea305 submerged		600ea B.H.P.
m No. 44, submarine	,,	,,	700 surface 900 submerged		—
m No. 6, motor boat	,,	Italian	4	—	30 B.H.P.

All Engines, except for pass. and cargo boats, by Fiat San Giorgio, Turin.

Fratelli Orlando & Co. (through Amerigo Gori, Leghorn).

m Zoea, submarine	Steel	Italian	—	dis.245-300	600
t Audace and Animoso, destrs.	,,	,,	—	700ea	17,000
† Tzar Ferdinando, mail str.	,,	Bulgarian	1,209	1,994	2,100

Engines, except for Zoea, by same Establishment.

The Royal Dockyard, Castellamare di Stabia.

t Duilio, Dreadnought	Steel	—	—	21,500	24,000 S.H.P.
WORK ON HAND—					
† Campania and Basilicata	Steel	—	—	2,480ea	4,000ea

Sta. Esercizio Bacini, Genoa.

† Torino	Steel	Italian	2,490	4,000	4,000
WORK ON HAND—					
a Nos. 64 and 65	Steel	Italian	—	10,500ea	8,800ea

Engines by same Establishment.

Ste. Anon Cantieri Marittimi & Fluviale, Leghorn.

* 8 Small crafts	Steel	Italian	tot. 119	370	910
WORK ON HAND—					
* 6 Vessels (tug boats, etc.)	—	Italian	94	261	635

Engines by same Establishment.

Officine & Cantiere Napoletani C. & T. T. Pattison, Naples.

Impavido, Impetuoso, and Insidioso, T.B.D.'s	Steel	Italian	dis.686ea	—	18,000ea
† 7 Torpedo boats	,,	,,	dis.121ea	—	3,600ea
WORK ON HAND—					
t Francesco Nullo and Antonio Mosto, T.B.D.'s	Steel	Italian	dis.770ea	—	18,000ea
t 4 T.B.D.'s	,,	Roumanian	dis.1,460ea	—	—

Engines by the same Establishment.

Sta. Anon. Bocini E. Scali Napoletani, Naples.

WORK ON HAND—					
8 Colliers	Iron	Ital. Navy	—	—	—
12 White torpedo tubes	—	,,	—	—	—

Ste. Anon. Veneziana Industrie Navali e Meccaniche, Venice.

* Porto Empedocle	Steel	Italian	120	210	400
* 9 Smaller cratt	—	,,	73	159	780
WORK ON HAND—					
* 3 Vessels	—	Italian	— total	46	255

Engines by same Establishment.

Cantiere Navale Poli, Chioggia.

Barges	Steel	Ital. Gov.	—	600	—
* Floating crane	,,	Italian	—	350	100
Lombardier sailing ship	,,	,,	—	400	—

SPANISH.

Cia. Euskalduna de Construccion y Reparacion de Buques, Bilbao.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Gorbea-mendi, single deck	Steel	Spanish	—	4,291	401
Pontoon, S.G.O.C., 130-ton sheer legs	,,	,,	—	644	—
* Leon, single deck	,,	,,	—	172	36
† Tug Altsu-mendi, single deck	,,	,,	—	144	48
† Cabo tres Forcas, awning dk.	,,	,,	—	2,265	188
† Tug Obrascon No. 1, sin. dk.	,,	,,	—	144	48
† Tug Obrascon No. 2, sin. dk.	,,	,,		58	20
WORK ON HAND—					
Yard No. 32, single decker	Steel	Spanish	—	4,200	—

Sociedad Espanola de Construccion Naval, Ferrol.

t Bustamante, destroyer	Steel	Spanish	—	dis. 370	6,250
t Nos. 6, 7 and 8, torp. boats	,,	,,		181ea	3,750ea
t Alfonso XIII., battleship	,,	,,		15,450	15,500
t Villamil, destroyer	,,	,,		370	6,250
WORK ON HAND—					

One torpedo boat and one destroyer building. One battleship building one fitting out.

Engines by same Company.

* Compound. † Triple. *m* Motor.
t Turbine. *a* Quadruple.

AMERICAN.

American Shipbuilding Co., Cleveland and Lorain.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
CLEVELAND.					
† Radiant, oil steamer	Steel	American	1,257	2,487	1,500
LORAIN.					
S. O. Co. No. 85, oil barge	Steel	American	2,042	2,441	—
† Brilliant, oil steamer	,,	,,	1,260	2,486	1,500
† Richard Comet, oil steamer	,,	,,	1,258	2,486	1,500
† Alton C. Trimble, freight st.	,,	,,	5,868	7,607	1,880
† Dustin, freight steamer	,,	,,	5,609	7,978	1,700

Engines by same Establishment.

Bath Iron Works, Bath, Maine.

t Cassin and Cummings, twin-screw destroyers	Steel	American	1,020dis.	—	shaft16,000
* Katahdin, pass. and frt. str. (Inland lake)	,,	,,	—	300	275
WORK ON HAND—					
t McDougal, destroyer	Steel	American	1,020dis.	—	16,000
t No. 60, destroyer	,,	,,	1,090dis.	—	17,500

Engines, except for Katahdin, by same Company.

F. S. Bowker & Son, Phippsburg, Me.

William McCritchett, 3 mast	Wood	American	472	544	—

J. F. Duthie & Co., Wash.

‡‡ Leschi, side wheel ferry	Steel	U.S.A.	—	ab577	700

Fore River Shipbuilding Corporation, Quincy, Mass.

m 2 Holland submarines	Steel	American	—	dis.521ea	—
m 2 Holland submarines	,,	,,	—	dis.519ea	—
t Duncan, torpedo-boat des.	,,	,,	—	dis.1,010	16,000
a Richmond, oil tanker	,,	,,	4,089	6,563	5,000
4 Car floats	,,	,,	—	—	—
† 3 Fishing trawlers	,,	,,	119ea	253ea	450ea
† Amolco tanker	,,	,,	—	—	1,300
WORK ON HAND—					
Rivadavia, battleship	Steel	Argentine	27,600dis.	—	40,000
Nevada, battleship	,,	American	27,500dis.	—	26,500
Cushing, torpedo-boat des.	,,	,,	1,050	—	17,000
No. 57, torpedo-boat des.	,,	,,	1,090	—	17,500
m 5 Holland submarines	,,	,,	—	—	—
m Fulton, submarine tender	,,	,,	—	—	900
† Atlantic and Pacific, cargo steamers	,,	,,	ab.3,500ea	ab.5,200ea	2,100

Engines, except for submarines, by same Establishment.

Harlan & Hollingsworth Corp., Wilmington, Delaware.

† Narragansett and Manhattan, pass. and cargo twin-scr.	Steel	American	—	3,539ea	4,800ea
2 Car floats	,,	,,	—	852ea	—
† Bayonne, scr. ferry boat	,,	,,	—	1,234	1,500
* Bridgeton and Salem, scr. ferry boats	,,	,,	—	770ea	700ea
Car float, No. 426	,,	,,	—	1,300	—
† Siala, tw.-sc. yeht. (eng. on.)	Steel	,,	—	—	1,200
* Delaware, fishg. st. (eng. on.)	Wood	,,	—	—	400
* Rehoboth and A. Brooke Taylor, fishg. sts. (eng. on.)	,,	,,	—	—	480ea
WORK ON HAND					
Car float	Steel	American	—	880	—
* Hull, No. 429, sc. ferry boat	,,	,,	—	750	750

Engines by same Establishment.

Manitowoc Shipbuilding and Dry Dock Co., Manitowoc, Wis.

No. 6, dipper dredge	Steel	American	—	622	—
Hydro, sand suction dredger	,,	,,	870	1,280	550
Niagara, hydraulic dredge	,,	,,	—	—	—
1913-14, Car floats	,,	,,	—	368ea	—
Frederick W. Robbins, tug	,,	,,	95	140	600

Maryland Steel Co., Sparrow's Point, Maryland.

a Montanan, Pennsylvanian, Panaman and Washingtonian, cargo	Steel	American	4,064ea	6,649ea	4,000ea
† City of Annapolis and City of Richmond, Bay pass. sts.	,,	,,	1,127ea	1,923ea	2,500ea
2 Lump barges	,,	,,	700ea	1,000ea	—
WORK ON HAND—					
a Iowan and Ohioan, cargo	Steel	American	4,064ea	6,649ea	4,000ea
4 Dump barges	,,	,,	700ea	1,000ea	—
* 2 Lighters	,,	,,	373ea	549ea	345ea

Engines by same Company.

New London Ship and Engine Co., Groton, Conn.

m Iquique, submarine	Steel	Chilian	—	dis.312	600
m Antofogasta, submarine	,,	,,	—	dis.309	600
m 7 Submarines	,,	American	—	dis.2,632	tot.6,300
m 50 ft. Cutter	Wood	,,	—	20	150
m Tender	,,	,,	—	135	120

Submarines built by Electric Boat Co., Cutter and Tender by U.S. Navy yards. All engined by The New London Co.

WORK ON HAND					
m 9 Submarines	Steel	American	—	dis.3,856	tot8,040
m Fulton, submarine tender	,,	,,	—	1,410	900

Submarines built by Electric Boat Co. and all engined by The New London Co. Fulton built and engined by The New London Co.

* Compound. † Triple. *m* Motor.
t Turbine. *a* Quadruple.

New York Shipbuilding Co., Camden, New Jersey.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Vesta, oil steamer	Steel	American	2,223	3,663	1,900
Car float, harbour use	,,	,,	app.1,015	app.1,015	—
† Socony, oil steamer	,,	,,	2,223	3,663	1,900
† Congress, pass. & frt. T.S.S.	,,	,,	4,912	7,985	7,000
Car float, harbour use	,,	,,	app.1,015	app.1,015	—
Tyler, cargo steamer	,,	,,	2,960	3,928	1,750
2 Car floats, harbour use	,,	,,	app.840ea	app.840ea	—
2 Car floats, harbour use	,,	,,	800ea	800ea	—
2 Car floats, harbour use	,,	,,	1,015ea	1,015ea	—
†t Downes, torpedo boat des.	,,	,,	1,010dis.	—	17,000 S.H.P.
WORK ON HAND—					
t Moreno, Argen. battleship	Steel	Argentine	27,650dis.	—	45,000 S.H.P.
Fei Hung, Chinese cruiser	,,	Chinese	2,600dis.	—	6,500 S.H.P.
†t Oklahoma, battleship	,,	American	27,500	—	24,800
†t Ericsson, T.B.D.	,,	,,	1,050dis.	—	17,500
† Hampden, collier	,,	,,	2,780	4,727	2,100
N.Y. Municipal Ferry	,,	,,	—	app.1,070	1,900
gt Melville, destr. tender	,,	U.S.N.	—	app.7,150	4,300 S.H.P.
Nos. 150 and 151, T.B.D.'s.	,,	,,	appx. dis.1,090ea	—	19,000 S.H.P.
2 Car floats, harbour use	,,	American	app.925ea	ap.925ea	—
Car float, harbour use	,,	,,	app.725	app.725	—
Car float, harbour use	,,	,,	app.1,385	ap.1,385	—

Engines by same Establishment.

Seattle Construction and Dry Dock Co., Seattle, Wash.

† Tacoma, day passenger	Steel	American	458	836	3,760
† Commanche, cargo vessel	,,	,,	350	547	450
† Milwaukee, tug	,,	,,	101	222	860
Col. P. S. Michie, suction hopper dredge	,,	,,	—	1,838	1,600
† Cyprus, yacht	,,	,,	505	1,037	3,000
Iquique and Antofogasta, submarines	,,	Chilian	—	—	—
H3 and K4, submarines	,,	American	—	—	—
WORK ON HAND—					
gt Bushnell, submarine tender	Steel	American	—	ab. 2,500	—
† 3 Vessels, tugs	,,	,,	—	ab. 240ea	800
† 9 Coal barges	,,	,,	—	ab. 400ea	—

All engines, except for dredger and submarines, by same Company.

Skinner Shipbuilding and Dry Dock Co., Baltimore.

* 2 Tug boats	Steel	American	135ea	—	1,100ea

Engines by same Establishment.

Spedden Shipbuilding Co., Baltimore.

‡ Cataract, fireboat	Steel	American	82	120	560

Engines by same Establishment.

Toledo Shipbuilding Co., Toledo. O.

nc Essex, ferry boat	Steel	American	181	266	800

Engines by same Company.

Union Iron Works, San Fran.

† Wm. Chatham, lumber str.	Steel	American	915	1,600	1,250
† H. T. Scott, lumber str.	,,	,,	915	1,596	1,250
† Aroline, lumber steamer	,,	,,	856	1,456	1,250
‡ Petroleum H3, stern wheel oil boat	,,	,,	—	256	125
WORK ON HAND—					
† Frank H. Buck, tanker	Steel	American	—	ab. 5,900	2,600
Barge No. 8, oil in bulk	,,	,,	—	—	—
Caisson for Isthmian Canal	,,	,,	—	—	—

Engines by same Establishment.

U.S. Navy Yard, Brooklyn, N.Y.

WORK ON HAND—					
New York, battleship	Steel	American	—	—	30,000
Not named, battleship	,,	,,	—	—	34,000

Engines by same Establishment.

U.S. Navy Yard, Mare Island, Cal.

* Monocacy, river gunboat	Steel	American	Not measured		800
* Palos, river gunboat	,,	,,	,,		800
† Guard (rev. cutter)	Wood	,,	,,		150
WORK ON HAND—					
† Kanawha, tw.-sc. fuel ship	Steel	American	4 500est.	7 500est.	5 200
m Maumee tw.-sc. fuel ship	,,	,,	4 500est.	7 500est.	5 200

Engines by same Establishment.

Dubuque Boat and Boiler Works, Dubuque.

H. S. Taber and Robt. McGroger, stern wheel	Steel	American	500ea	—	500ea
WORK ON HAND—					
8 Barges, 24 × 100 ft.	—	—	350ea	—	—

W. & A. Fletcher Co., North River Iron Works, Hoboken, N.J., U.S.A.

b Berkshire, pass. and cargo	Steel	American		—	4,400
* Washington Irving, pass.	,,	,,		—	6,000
* Transfer No. 18, tug	,,	,,			1,100
WORK ON HAND—					
* Catskill, scr. ferry str.	Steel	American	—	—	1,600

Engines by same Company.

† Triple. †t Triple Expansion and Turbines. gt Geared Turbines.
* Compound. ‡ High Pressure. nc Non-condensing. m Motor.
b Beam.

Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Illinois, single scr. bulk oil	—	American	—	5,225	2,800
Lorenzo, single scr. freight	—	,,	—	3,063	1,500
Tamssi, single scr barge	—	,,	—	658app.	—
Matsonia, single scr. freight and pass.	—	,,	—	9,729	—
Topila, single scr. bulk oil	—	,,	—	5,125	2,350
Manoa, single scr. cargo and pass.	—	,,	—	6,900	—
L. K. Thurlow, cargo str.	—	,,	—	3,176	1,200
Nereus, collier	—	Amer. Navy	—	—	—
WORK ON HAND—					
Manoa, single scr. cargo and pass.	—	American	—	6,900	4,000
J. D. Archbold, single scr. oil carrier	—	,,	—	6,000	2,800
Neches, single scr. cargo	—	,,	—	5,800	4,100
Medina, single scr. cargo	—	,,	—	5,800	4,100
J. D. Rockefeller, single scr. oil carrier	—	,,	—	8,000	2,800
Texas, battleship	—	Amer. Navy	—	—	—
Pennsylvania, battleship	—	,,	—	—	—

Engines by same Establishment.

William Cramp & Sons, Ship and Engine Building Co., Philadelphia.

ct Parker, T.B.D.	Steel	U. States	1,010dis.	—	16,000
ct Benham, T.B.D.	,,	,,	1,010dis.	—	16,000
† Santa Clara, cargo str.	,,	,,	—	6,000	3,000
† Santa Cecilia, cargo str.	,,	,,	—	6,000	3,000
† Santa Catalina, cargo str.	,,	,,	—	6,000	3 000

10 Coal barges 500 tons coal capacity no machinery.

—WORK ON HAND

ct Aylwin, Parker, Benham, and Balch, T.B.D.'s	Steel	U. States	—	dis.1,010ea	16,000ea
ct O'Brien, Nicholson and Winslow, T.B.D.'s	,,	,,	—	dis.1,050ea	17,000ea
† Sacraments, gunboat	,,	,,	—	1,425	950
pt T.B.D. 58 and 59	,,	,,	—	1,090ea	18,000ea
pt 2 Express strs., pass.	,,	,,	—	10,000	23,000

Engines by same Establishment.

Great Lakes Engineering Works, Mich.

a North American, Great Lakes pass. steamer	Steel	American	1,262	2,317	2 200
* Chas. Heiden, sand str.	,,	,,	446	717	400
a Boston, package freighter	,,	,,	—	app.4,184	1,760
† Hull No. 129, Lake car ferry	,,	,,	—	2,670	2,500
4 Coal Barges	—	—	—	—	—
2 Dredgers, grain lighter and flat scow.					
WORK ON HAND—					
† 3 Gt. Lakes car ferries	Steel	American	—	app.2,670ea	2,700ea
Self-unldng Bula cargo str.	,,	,,	—	4,900	1,770
South American Gt. L. pass. str.	,,	,,	—	2,650	2,700
Coast lumber steamer	,,	,,	—	2,100	1,400
Lake freighter	,,	,,	—	—	—

Engines by same Establishment.

CANADIAN.

WORK ON HAND—

Kingston Shipbuilding Co., Ltd., Kingston, Ont.

Name of Vessel.	Material	Flag.	Net Tns.	Gr. Tns.	I.H.P.
2 Dump Scows 500 cub. yds.	Steel	—	—	—	—

Collingwood Shipbuilding Co., Ltd., Collingwood, Ont.

† James Carruthers, cargo	Steel	Canadian	5,606	7,862	2,400
2 Self-propelling buck. drgrs.	,,	,,	565ea	830ea	800ea
Passenger and cargo		,,	313	460	500
WORK ON HAND—					
One vessel, similar to James Carruthers (550 ft. × 58 ft. × 31 ft.)	—	—	—	—	—
Dump Scow, 130 ft. × 30 ft. × 11 ft.	Steel	—	—	—	—

Engines by same Company.

AUSTRALIAN.

Australian Gov. Dockyard, Cockatoo Island, Sydney,

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
WORK ON HAND—					
t Torrent, Derwent and Swan, Sp. T.B.D.'s	Steel	Australian	—	ea700dis.	9,000ea
Brisbane, light armoured cruiser	Steel	,,	5,400dis.	—	25,000
* Commonwealth, sc. str.	,,	,,	65dis.	—	—
* Sydney Harb. bucket dredger	,,	,,	426	—	580

Engines, except for Cruiser, by same Establishment.

Morrison & Sinclair, Balmain, Sydney.

* Kanneruka, ferry st.	Wood	British		—	—
* Karingal, ferry st.	,,	,,		—	—
* Karrabee, ferry st.	,,	,,		—	—
m Myrna, sailg. yeht.	,,	,,		—	—
* Benandra, coastal steamer	,,	,,	—	—	—

ct "Corliss" Twin. † Triple. pt Parsons Turbines. a Quadruple.
* Compound. m Motor.

Morts Dock & Engineering Co., Ltd., Balmain, Sydney.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
† Barrenjoey, double-ended pass. st.	Steel	British	340	499	1400
WORK ON HAND—					
2 Oil barges	Steel	Australian	—	—	—
1 Suction dredger	,,	,,		1,500	—

2 Sets of triple-expansion engines of 600 i.h.p.
Engines by same Establishment.

Poole & Steel, Balmain, Sydney.

* Margaret, tug	Steel	British	—	137	514
WORK ON HAND—					
* Bucket dredger (self-propelling)	Steel	British	157	389	520

Engines by same Company.

Robison Bros. & Co., Melbourne.

* Jenner, 70′ × 14′ St. Lch.	Steel	Australian		65	220
WORK ON HAND—					
* One similar vessel to above.					

Engines by same Establishment.

JAPANESE.

Ishikawajima Shipbuilding & Engineering Co., Ltd., Tokyo.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
2 Hopper barges	Steel	Japanese	—	80ea	—
Pump dredger pontoon	,,	,,	—	330	—
Caisson, 66′ × 12′ × 20′	,,	,,	—	—	—

Kawasaki Dockyard Co., Ltd., Kobe-Hyogo.

t Sakak Maru, awng. deck	Steel	Japanese	—	3,875	12,890
† Kashima Maru, 3 decker	,,	,,	—	10,558	9,900
† Daisan Nishiso Maru, trawler	,,	,,	—	250	640
† Tai Toku Maru, trawler	,,	,,	—	250	650
† No. 369, 3 decker	,,	,,	—	11,900	11,500
Haruna, battle cruiser	,,	,,	—	abt27,500	—
WORK ON HAND—					
No. 371, shelter deck	Steel	Japanese	—	5,600	6,500
No. 372 and 373, 3 deckers	,,	,,	—	7,500ea	6,000ea
No. 374, shelter deck	,,	,,	—	9,600	8,500
Battlestip	,,	,,	—	30,800	—

Engines by same Establishment.

Mitsu Bishi Dockyard & Engineering Works, Nagasaki.

gt Anyo-Maru, steamer	Steel	Japanese	—	9,533	7,998
tt Katori-Maru, Pass. and cargo steamer	,,	,,	—	10,512	11,781
No. 239, motor boat	,,	Russian	—	—	—

Kirishima, Imperial Jap. Admiralty order.

WORK ON HAND—					
Nos. 234 and 235 Imperial Jap. Admiralty orders	—	—	—	—	—
† Suwa-Maru & Fushimi-Maru Pass. & cargo	Steel	Japanese	—	11,900ea	11,500ea
No. 241, Imperial Jap. Admiralty order	—	—	—	—	—
gt Nos. 242-243, cargo sts.	Steel	Japanese	—	7,600ea	5,800ea
† No. 244, steamer	,,	,,	—	10,000	5,500

Engines by same Establishment.

The Mitsu Bishi Dockyard & Engine Works, Kobe.

† Kiyo Maru, trawler	Steel	Japanese	154	286	735
WORK ON HAND—					
† No. 55, cargo ship	Steel	Japanese	—	1,500	1,200
† No. 56, tug boat	,,	,,	—	75	300
† No. 57, pass. & cargo ship	,,	,,	—	1,030	900
Nos. 58 and 59 Fumigat'n bts	,,	,,	—	60ea	—

Engines by same Establishment.

The Osaka Dock Co., Osaka.

2 Steam trawlers	Steel	Japanese	—	476	1,253
Pump dredger	,,	,,	—	600cap	735
2 bucket dredgers	,,	,,	—	400	—
Kitan-Maru, Pass. bt	,,	,,	—	332	351
3 Barges	,,	,,	—	cap.1,500	—
Daium-Maru 6 and Daium-Maru 7 cargo boats	,,	,,	—	589ea	834ea
Miho-Maru, fish carrier	,,	,,	—	527	543
Kijojo-Maru and Onjo-Maru, cargo boats	,,	,,	—	313ea	778
Daium-Maru, cargo boat	,,	,,	—	600	430
Steam launch & tug bt.	,,	,,	—	149	—
Tosei-Maru, cargo bt.	,,	,,	—	635	—
No. 810, self-propelling barge	,,	,,	—	1,010	—
WORK ON HAND—					
6 cargo boats	Steel	Japan	—	abt.12,188	—

Engines by same Establishment.

The Yokohama Dock Co., Yokohama.

Koyasu Maru, tug bt.	Steel	Japanese		118	370
Kai-Jin, do.	,,	,,		205	550

Also 128 vessels of 649,800 gross tons, dry docked.

† Triple. * Compound. *t* Turbines. *gt* Geared Turbines.
tt Triple Expansion and Turbines

CHINESE.

W. S. Bailey & Co., Hong Kong.

Name of Vessel.	Material.	Flag.	Net. Tns	Gr. Tns.	I.H.P.
‡‡Tai Juck Fong, stm. launch	Wood	British	—	55	95
‡‡Bon Accord, do.	,,	,,		48	65
Sailing yacht	,,	Russian		3	—
11 Motor boats	,,	Various		197	349
1 Motor boat, hull only	,,	British		3	—
WORK ON HAND—					
† Single sc. steamer	Steel	American		abt. 600	650
‡‡Tug	Wood	French		60	140
‡‡2 Lighters	Steel	American		230	—

Compound surface-condensing engines by same Company.

The Taikoo Dockyard & Engineering Co. of Hong Kong, Ltd., Hong Kong.

m Ah Kwang, twin screw	Steel	Chinese	—	612	480
m 2 Motor vessels	,,			total 106	100
Gilbert, rev. cutter	Steel	American		370	1,350
Wuchang, tw. sc.	,,	Chinese		3,500	1,400
Medusa ,,	,,	,,		778	700
m Tungkwong	,,	,,	—	147	240
Small craft, lighters, etc.	—	—	—	373	—
* Sylvia, launch (engines only)	—	—		—	150
WORK ON HAND—					
No. 140, Scr. stm.	Steel	—		app.2,000	1,850
No. 148, ,,	,,	—		2,100	1,400
No. 149 ,,	,,	—		2,100	1,400

Engines for Gilbert, Wuchang, Medusa and Nos. 140, 148, 149, by same Company.

New Engineering & Shipbuilding Works, Ltd., Shanghai.

Hopper Barge	Steel	Foreign	—	176	—
3 Lighters	,,	British	—	150	—
8 Pontoons	,,	—	—	674	—
5 launches, 2 tugs, 1 barge	,,	Various	—	103	215

Engines for 1 launch of 40 h.p. by same Company.

WORK ON HAND—					
† River steamer	Steel	Chinese	—	2,500	2,000
† 2 tug boats	,,	British	—	250ea	500ea
2 Motor barges	,,	Foreign	—	300	520
2 lighters	,,	British	—	400	—

Engines for both tug boats by same Company.

The Shanghai Dock and Engineering Co., Ltd., Shanghai.

Slavianka, steam tug and ice breaker	—	Russian	—	100	350
Laestrygon, pont. cargo hulk	Steel	British	—	3,000	—
9 Cargo lighters	,,	,,	—	75ea	—
Hopper barge	—	—	—	250	—

2 large battle practice targets for British Government, also numerous small craft and docking and repairing vessels.

WORK ON HAND—					
Steam collier	Steel	—	—	6,000	—

Twin-screw river steamer, passenger tender, salvage tug, 1,200 I.H.P. and two seagoing tugs.

INDIAN.

John King & Co., Ltd., Howrah, Calcutta.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
7 Cargo boats	Steel	British	tot. 380	—	—
3 Cargo flats	,,	,,	tot. 3,000	—	—
15 Cargo boats	,,	,,	tot. 1,800	—	—
Pontoon	,,	,,	46	—	—
3 Cargo boats	,,	,,	tot. 250	—	—
m 9 Pleasure boats	Wood	,,	22	—	84
m Sasikala, house boat	,,	,,	20	—	22
* Steam tug boat	Steel	,,	64	—	154
* Otterbourne, launch	,,	,,	25	—	100
No. 586, house boat	Wood	,,	30	—	—

Compound machinery by same Company.

STRAITS SETTLEMENTS.

United Engineers, Ltd., Singapore.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
6 Lighters	Wood	Brit & Dutch	325	394	—
5 Launches (1 stm. 4 motors)	,,	Dutch	37	62	240
2 Steam patrol vessels	,,	,,	26ea	83ea	210ea
Snagging barge	,,	Fed.Malay St.	26	26	—
Ferry service	Steel	,,	18	18	—
Motor cruiser	Wood	British	6	12	47
WORK ON HAND—					
Motor launch	Steel	Dutch	7	11	30
Sternwheeler	,,	Fed. Malay St.	17	21	90
T.S. towing launch	,,	,,	18	28	140

Also 15 small motor launches.
Engines for 1 steam launch built by same Company.

Central Engine Works, Ltd., Singapore.

‡‡Hong Aik, steamer	Wood	British		—	160
m Eve, teak launch	—	Dutch	—	—	60
m 6 Motor launches	—	—	—	—	124
WORK ON HAND—					
10 Barges	Steel	Fd.Malay St.	—	—	—

‡‡ Compound Surface Condensing. † Triple. *m* Motor. * Compound.

ARGENTINE.

Dekade, Buenos Aires.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P..
6 Vessels (lighters)	Steel	Argentine	851	—	—
10 Vessels (lighters)	,,	Argent. and Uruguay	2250	—	—
Built by other firms, only erected by Dekade.					
WORK ON HAND—					
5 Vessels (tugs, etc.)	Steel	Argent. and Uruguay	—	—	—
3 vessels (erected only)	,,	Argentine	—	—	—

WORK COMPLETED DURING THE YEAR.

ENGLISH.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.—The vessels built by the Company since 1852 number 857, with a gross tonnage of 1,668,303 and a total I.H.P. of 1,714,876, of which 129 were war vessels of 513,829 gross tons.

Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.—In addition to work shown under the Tyne Section, the repair department have during the year carried out some extensive repair jobs and alterations. 230 vessels, with a gross tonnage of 350,000, have been docked. Several large repair jobs have been carried out, *viz.*:—The steamers Marthara, Strinda, Gunnar, Cederic, Othello, Elswick Grange, Vedra, Altona, etc. The Company also execute repairs on vessels loading in the harbour, and about 300 steamers have been dealt with for sundry repairs.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne.—Dry Dock Department.—During the year the Company has carried out a large volume of repair work, including the re-boilering and re-classing of the oil-carrying steamer Euplectela. At the present time they have in hand the extensive damage repairs to the steamer Coronation, which will occupy the Company's dry dock for a considerable period, as practically the whole of the double bottom has to be renewed. The work of lengthening the Company's dry dock to 460 feet is proceeding, and will be completed prior to the date of undocking the steamer Coronation.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend and Walker-on-Tyne.—In addition to tonnage launched, as set out under the Tyne Section, the dry docks department carried out a large number of extensive repairs to ships, engines and boilers. During ten years ending 1912, Messrs. Swan, Hunter & Wigham Richardson, Ltd., have launched 211 vessels of 931,879 gross tons, an annual average of 21 vessels of 93,188 gross tons, the maximum being in the year 1906, 25 vessels of 126,921 gross tons.

Central Marine Engine Works, West Hartlepool.—In addition to the engines built, as shown under the Engine Section, a very large increase in the output of the well-known "Cmew" steamship auxiliaries has been made, besides a large number of ships' forgings, including forged stern and rudder frames.

The Goole Shipbuilding and Repairing Co., Ltd., and Associated Firm The Dundee Shipbuilding Co., Ltd.—A large amount of repair work, both to hull and engines, has been effected at Dundee; extensive repairs to the Admiralty Destroyer Jackall are being done.

Reavell & Co., Ltd., Ipswich, have supplied their compressing machinery to a number of motor ships and His Majesty's ships Pactolus, Iron Duke, Marlborough, Tiger, Hardy, etc.

The Parsons Motor Co., Ltd., Southampton, have turned out close upon 4,000 b.h.p. in their petrol and paraffin engines, the major portion being of the paraffin type. The work is to Government standards and includes engines of some considerable size.

C. R. Toomer & Co., Ltd., S. Shields.—The works have been fully employed throughout the year, and a number of vessels have been re-classed under Lloyd's Survey—entailing extensive repairs. Hull, machinery and boiler repairs are effected.

Brigham & Cowan, Ltd., South Shields.—Work during the year has consisted of dry docking and repairs to hulls, boilers and machinery, on which the Company has had a very busy year. A large number of electric arc welding repairs to boilers and hulls of vessels by the British Arc Welding process have also been effected. Messrs. Brigham & Cowan are sole makers in this country of White's mechanical fuel oil burning system, which has proved most economical and satisfactory and is being taken up very rapidly by the principal lines of steamships, etc.

Seamless Steel Boat Co., Ltd., Wakefield, have completed 335 lifeboats, tonnage 1,364; 50 cutters, tonnage 170; 11 launches, tonnage 42, I.H.P. 181; 4 surf boats, tonnage 7; 2 anchor cutters, tonnage 4; and a barge.

Aldous, Ltd., Brightlingsea, have built the White Slave motor launch, 40 ft. long.

John I. Thornycroft & Co., Ltd., Southampton.—This Company has carried out during the past year an exceptionally large amount of marine work. In addition to vessels launched and engined as given in the English Channel section, repairs, alterations or refits have been effected to a large number of dockyard craft, troopships, yachts, liners, tramp steamers and commercial vessels of all kinds, some of the contracts being of a very extensive character. Their position opposite Southampton Docks gives them great facilities for this work. Additions and improvements have been made, ample to cope with an even greater volume of work.

Rogers & Co., Plymouth, have built a number of small craft.

Moonbeams, Ltd., Southampton.—Two small vessels have been built and engined by this Company and three are in hand.

Borwick & Sons, Windermere, have built 4 vessels, total gross tonnage 32; and have a pleasure launch on hand.

Allsa Craig Motor Co., Ltd., Chiswick, W., have built several vessels up to 38 feet length for home and abroad fitted with their engines. Their engine department has been very busy, twice the number of engines having been built and sent away than last year. 1913 has been a record year for this Company.

Baird Bros., N. Shields, have not made any new machinery during 1913, but have carried out many overhaul jobs, along with the usual repair work. The business has been turned into a private limited company, which has taken over the old firm of Baird Bros., and also placed a contract for a new graving dock of 160 ft. long and 45 ft. at gates and having for this size of dock the unusual depth of 21 ft. of water on the sill O.S.T. This will enable the largest trawlers to be docked at any tide; the breadth will also serve the purpose of docking two trawlers or coasting steamers together side by side, or three drifters can be docked at the same time. It is expected to have the dock in operation by the end of July, 1914.

Nicholson & Sons, Lancaster, have been very busy with repairs on steamers in Glasson Dock during the past year.

Messrs. Wailes, Dove & Co., Ltd., Newcastle-on-Tyne, patentees and sole manufacturers of patent "Bitumastic" solution, enamels and coverings, the well-known anti-corrosives, have during the year received orders from the Admiralty for coating twenty-five battleships, cruisers, submarines, etc. The huge floating dock now in commission at Portsmouth is also coated. Their "Bitumastic" specialities have during this year been applied to over 700 vessels passing through survey and new ships for the principal shipowners of the world, on the most vital parts, such as bunkers, engine and boiler room tanks, tank tops, etc., the gross tonnage of the vessels coated being about three million tons, and including such vessels as the "Imperator" (the largest vessel in the world). "Olympic," the large White Star liner "Britannic," now in course of construction. A large contract is also being carried out on the "Aquitania," now in course of construction by Messrs. John Brown & Co., Ltd., Clydebank, for the Cunard Line. The oil tank steamer "San Hilario," the largest oil-carrying vessel afloat, owned by the Eagle Oil Transport Co., Ltd., London, also has "Bitumastic" applied to the boiler-room tank and tank top. Their American house are busy with the largest contract ever placed for "Bitumastic" enamel work, viz., the coating of 46 pairs of steel lock gates on the Panama Canal, total area of surfaces to be coated being about 3,400,000 square ft. Patent "Bitumastic" solution has also been largely used by the leading shipowners, shipbuilders, engineering firms, municipal boards, railway companies, brewers, ice and cold storage companies, collieries, etc., and a large number of contracts carried out for coating with patent "Bitumastic" solution, corrugated iron buildings, bridges, smokestacks, coal shipping staiths, colliery head gears, water tanks and pipe tracks.

Isherwood System of Ship Construction.—The Isherwood system still continues to make rapid progress and the number of vessels contracted for on this system to date now totals to 276, representing almost a million and a quarter gross register tons. The number of vessels built this year shows a considerable advance on last year, as will be seen from the following figures:—In 1908, the number of vessels built was 2, representing 7,329 gross registered tons; in 1909, 8 vessels of 21,934 gross registered tons; in 1910, 25 vessels of 92,709 gross registered tons; 1911, 40 vessels of 154,634 gross registered tons; 1912, 52 vessels of 234,615 gross registered tons; 1913, 79 vessels of 384,372 gross registd. tons; a total of 206 vessels representing 895,593 gross registered tons. Included in this number are vessels of all types and descriptions, and apart from ordinary ocean-going vessels, it is perhaps of special interest to note that three other large ore-carrying vessels have been completed for service on the Great Lakes of America. In the development of the oil tanker, the system has played a prominent part, no fewer than thirty-nine of this class of vessel having been launched this year. The "San Fraterno," the 15,000 tons deadweight tanker built on the "Isherwood system," probably created more interest than any other vessel built in the current year, and it is the first of twelve similar steamers building on this system, the other four of which have now been launched. At the present moment about 85 per cent. of the total oil-tank tonnage building throughout the world is on the "Isherwood system," and up-to-date 103 vessels of this type are already built on or are being built on this system in the following countries:—United Kingdom, 66 vessels representing about 382,420 gross registered tons; Germany, 12 vessels of 71,408 gross registered tons; U.S.A., 16 vessels of 51,672 gross registered tons; France, one vessel of 3,500 gross registered tons; Italy, seven vessels of 14,000 gross registered tons; Sweden, one vessel of 5,000 gross registered tons; a total of 103 vessels representing 528,000 gross registered tons. Vessels have been constructed to the highest classification of Lloyd's Register, British Corporation, Bureau Veritas, Germanischer Lloyd, Norske Veritas and American Bureau, and the system has been adopted by the Governments of Great Britain United States of America and Italy.

The United States Metallic Packing Co., Ltd., of Bradford, have supplied their metallic packing to the following vessels during the year 1913:—H.M.S.'s Attendant, Carol, Tiger, Palinurus, Test, Endeavour, Benbow, Queen Elizabeth, Warspite, Barham, Valiant, Trefoil, Turmoil, Pathfinder, Malaya, new tug boat; s.s.'s Euripides and Marathon, Aberdeen Line; dredger No. 4, Aberdeen Harbour Commissioners; s.s.'s Baro Fejervary, Ferencz Josz of Kiraly and a new steamer, Adria Co. (Royal Hungarian N. Co.); tugs, Aire and Calder Navigation; new steamer, Allan Line S.S. Co.; s.s. Evangelos, Ambateilo Bros.; s.s. Shabonee, Anglo-American Oil Co., Ltd.; tug boat Paladin and new steamer, Anchor Line, Ltd.; s.s.'s Austuriano and Argentino, Argentina de Nav. a la Patagonia Cie; two new steamers, Asiatic Steam Navigation Co.; s.s. Africa, Austrian Lloyd's Steam Navigation Co.; s.s.'s Den of Airlie and Den of Ogil, Chas. Barrie & Son; s.s.'s Mopsa and Burma, Bennett S.S. Co.; s.s. Oxfordshire, Bibby Bros. & Co.; s.s. El Lobo, C. T. Bowring & Co.; s.s.'s Irrawaddi and Sarasvatti, Bombay Steam Navigation Co.; s.s. Lady Roberts, British and Irish Steam Packet Co.; s.s.'s

Chantala and Chakrata, British India Steam Navigation Co.; new steamer, Burns, Philp & Co.; s.s.'s Kathlamba and Kandahar, Bucknall Line S.S. Co.; s.s.'s Burcombe and two new steamers, Buddick and Cooke; fisheries cruiser Malaspina, customs cruiser Margaret and new vessels, Canadian Government; new steamers, Canadian Pacific Railway; s.s. Boxer and new vessels, Calcutta Port Commissioners; s.s.'s Bowes Castle and Muncaster Castle, J. Chambers & Co.; s.s. Riverton, R. Chapman & Sons; s.s.'s Star of Victoria, Star of England and new steamer, J. P. Corry & Co.; dredger, Sir William Matthews, Colombo Harbour Commissioners; s.s. Hitchin, Wm. Cory & Sons; s.s.'s Andania, Alaunia, Aquitania and Transylvania, Cunard S.S. Co.; new steamer, Denaby and Cadeby Coal Co.; s.s. Kelvinia, Donaldson Bros., Ltd.; s.s. Crofton Hall, G. C. Dunn & Co.; new steamer, East Asia S.S. Co.; s.s. Elele, Elder Dempster & Co.; s.s.'s Maronian, Malatian Mardinian, Kandahar, Netherby Hall and new steamer, Ellerman Lines, Ltd.; s.s. Portwood, W. France, Fenwick & Co.,; new steamer, Fratelli Cosulich and Austro-Americano; s.s. Renteria, Fearley & Egar; s.s.'s Dunclutha and Lissa, Glen & Co.; s.s. Verdala, Gow, Harrison & Co.; s.s. Lissette, Goole & West Riding S.S. Co.; s.s. Nottingham, Great Central Railway; new steamers, Hamburg-American Line; s.s.'s Haller and Alice, Geo. R. Haller, Ltd.; s.s.'s Mottisfont and Batsford, Harris and Dixon, Ltd.; s.s.'s Harbury and new steamers, J. & C. Harrison, Ltd.; s.s.'s Cividian and Explorer, T. & J. Harrison; s.s.'s Mindoon, Panthay, Mysore and Punjab, P. Henderson & Co. (Irrawaddi Flotilla Co. Ltd.); s.s's Oosterdyk, Westerdyk, Noordendyk and Stateudam, Holland-America Line; s.s. Insheria, Irish District Commissioners; s.s. Lord Downshire, Irish S.S. Owners Co., Ltd. (Thos. Dixon & Sons, managers); new cruiser (building in Japan), Japanese Government; s.s.'s Dartwen, Bronwen and two new steamers, W. & T. C. Jones S.S. Co., Ltd.; new steamer, Anders, Jacobsen; s.s.'s Clandeboye and Comber, John Kelly, Ltd.; s.s. Triton, Koninklijke Paketvaart Maatschappj; s.s. Georgius, Mr. Kyriakides; s s. Princess Royal, M. Langlands & Son; two new steamers, Lancashire and Yorkshire Railway; dredgers, Lagos Romulus and Lagos Remus, Lagos Harbour Commissioners; s.s. Floridian, F. Leyland & Co.; s.s. Florazan, Liverpool Shipping Co. (H. Fernie & Son, managers); s.s. Manx Isle, W. Lowden & Co., Ltd.; s.s.'s Dalcham, Langholm and Dunsley, London & Northern Steamship Co. (Pyman Bros.); s.s.'s Manchester Civilian and Knutsford, Manchester Liners, Ltd.; new steamers, McGregor, Gow & Co.; new steamer, McLay & McIntyre; s.s. Portreath, McNeil, Hinde & Co.; s.s. Katoomba, McIlwraith, McEachearn & Co.; s.s. Boyne, Mercantile Steamship Co., Ltd.; s.s. Nevishrook, Miller & Richards, Glasgow; new steamer, M. Murphy; s.s. Fjordham, Mail & Holby; s.s. Almond Branch, Nautilus S.S. Co.; p.s. Kenilworth, North British Railway Co.; s.s.'s Rioun and Rotti, Nederlandsche Steamboat Maatschappj; s.s. Oriana, Pacific Steam Navigation Co.; s.s. Frankmere, Palace Shipping Co., Ltd.; s.t. Cabot, J. Payne & Co.; s.s. Hopeful, F. W. Powell & Co., Ltd.; s.s.'s Eustace, Sandsend and new steamer, G. Pyman & Co.; s.s. Socoa, Plisson & Co. (Lysberg, Ltd., managers); s.s. Elite, Parceria de Geral de Pescarias; new steamers, Pinillos Izquierods & Co.; s.s. Rotterdam, James Rankine & Son; two new steamers, Rowlands and Marwood S.S. Co.; s.s.'s Radnorshire, Cardiganshire and Merionethshire, Royal Mail Steam Packet Co.; s.s.'s Salmonpool, Somerby, Wearpool, Baldersby, Seapool, Teesdale, Wraghy, Trunkby, Burnby, Stagpool, Brookby, Westonby and Theresa Heymann, Ropner & Co.; s.s.'s Empress Ekaterina II., Alexander III., Emperor Peter the Great, Queen Olga and new steamer, Russian Steam Navigation and Trading Co.; s.s. Gwladys, P. Samuel & Co.; s.s. Raloo, Shamrock S.S. Co.; new steamer, W. R. Smith & Sons; s.s.'s Ridley and Ryton, Stephens, Sutton & Stephens; s.s. Uncas, Tank Storage & Wagon Co., Ltd.; s.s. Tropea, E. C. Thin; s.s.'s Clarissa, Radcliffe and Swindon, Evan Thomas Radcliffe & Co.; s.s. Nunima, Treckmann Steamship Co., Ltd.; s.s. Snilesworth, J. Tully & Sons; s.s.'s Garron Head and Orloch Head, Ulster S.S. Co., Ltd.; s.s.'s Llandovery Castle and Llanstephen Castle, Union Castle Line S.S. Co., Ltd.; s.y. Bantam, B. H. Walton; s.s.'s Haddonhall, Boltonhall, Cliftonhall, Vauxhall, Dinsdalehall, Askehall, Polamhall, West Hartlepool Steam Navigation Co., Ltd.; s.s. Thornfield, Zillah Shipping Co., Ltd.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.—A large number of vessels have been docked and repaired during the year, and the firm's two dry docks are fully occupied.

S. P. Austin & Son, Ltd., Sunderland.—The output of this Company during the year, as given under the Wear Section, is the largest of recent times and the whole of the vessels were of special collier type, one of these being the largest engaged in the London coal trade, *viz.*, to carry 5,250 tons deadweight. The Company has had a busy year with repair work and the tonnage of the vessels docked for painting and repairs amounted to 250,000 gross register tons. The work included extensive damage repair contracts, re-classifications and overhauls. Vessels up to 7,000-8,000 tons deadweight carrying capacity have been pontooned for repairs and the Company can dock all vessels coming to the port for loading, with but few exceptions.

John Crown & Sons, Ltd., Sunderland.—During the year have effected repairs to vessels totalling 89,486 tons.

SCOTCH.

Muir & Findley, Glasgow, have constructed eighty-four marine boilers in 1913 up to 10 ft. 3 in. diameter under Board of Trade, Lloyd's, Bureau Veritas, Brazilian Admiralty and other Surveys, for pressures up to 185 lbs. per square inch.

J. Weatherhead, Eyemouth, has built one motor launch 25 ft. in length and fitted oil engines to a number of fishing vessels.

Hawthorns & Co., Ltd., Leith.—In addition to vessels launched (see Clyde Section), the Company have also constructed during the year the following slipways. One of 1,000 tons capacity to the order of the Societa Anonima Bacini e Scali Napoletani, Naples. The slipway is of the longitudinal type, on an incline of 1 in 12, and has a cradle constructed throughout of steel, 240 ft. in length, the haulage being done by means of a steel wire rope, working on the 4 and 5-sheave block principle, there being a separate and independently driven winding drum to accommodate the great length of the wire rope employed. The haulage machinery is electrically driven by motor of 100 b.h.p. Another slipway of 600 tons capacity to the order of Messrs. J. Whittall & Co., Ltd., London, for the Hai Ho Conservancy, Tientsin. This slipway is of the broadside type, with steel cradle, 120 ft. in length, which may be either used as a whole or divided into three minor cradles when desired. The haulage is a direct pull by means of three independent steel wire ropes, operated by one triple drum, steam-driven purchase. The slipway has been designed to handle icebreakers and smaller craft. There is now in hand one slipway of 1,000 tons capacity with one double steel cradle and electrically-driven haulage machinery for the North of France.

William Beardmore & Co., Ltd., Dalmuir.—In addition to work under Launch section, Beardmore crude oil engines have been installed in the Innisshanuon and Innistrahull of 230 b.h.p. each, Innislargie 130 b.h.p., Totland and Selsea 80 b.h.p. each, and three other vessels have been supplied with engines of 45, 120 and 60 b.h.p. respectively.

Menzies & Co., Ltd., Wet Dock, Leith.—In addition to the "Flowing Tide" engined, the year has proved a record in classification and general repairs for this firm, including a large amount of Admiralty work, and the largest damage repair ever undertaken in Leith; the number of vessels dry-docked alone being over 200.

IRELAND.

Dublin Marine Motor and Boat Co., Dublin, have built the Tara, a pleasure yacht with auxiliary Mandsley motor.

AMERICAN.

Frisbie Motor Co., Middletown, Conn., U.S.A., have built and distributed a number of motors ranging from 3 to 75 H.P. and one to six cylinders.

Kensington Shipyard Co., Philadelphia, Pa., have been engaged in repair work only.

Fermaat & Monahan Co., Oshkosh, Wis., have built a number of gasoline and kerosene marine engines from 2 to 36 H.P. both 2 and 4 cycle.

Wolverine Motor Works, Bridgeport, Conn., have built and sold 382 engines ranging from 36 to 200 H.P. each, which have been distributed all over the world.

CANADIAN.

Canadian Vickers, Ltd., Maisonneuve, Montreal, have had ships of almost all classes and tonnage in their floating ship dock during the past year. The Company started with docking the largest ship of the Richelieu and Ontario Navigation Co., *viz.*, the Montreal, and have also docked such important ships as the Lake Manitoba, 9,674 tons, and Mount Temple, 8,790 tons, belonging to the C.P.R. Among the number of ships docked belonging to the inland marine are the Kenora (Canadian Interlake Line), 1,955 tons; s.s. Wallula (privately owned), 1,924 tons; s.s. Majestic (R. & O. Navigation Co.), 1,577 tons; Dredge No. 1 (Dept. of Marine and Fisheries), 700 tons, and others. They have also arranged for the overhaul and repair of the s.s. Murray Bay (of the R. & O. Navigation). She will occupy one portion of the ship dock for the winter, in company with a number of smaller craft. The shipping companies who have ships trading to the St. Lawrence have welcomed the Company's ship-dock in a very satisfactory manner, and next season, when the plant is entirely completed, further assistance from these great shipping companies is anticipated.

There is no building to report from this yard, at present, only repairing being carried on.

Halifax Graving Dock Co., Ltd., Halifax, N.S.—This Company owns the Chebucto Marine Railway. No building is carried on at present, only repairing being done.

SWEDEN.

Aktiebolaget Diesels Motorer, Stockholm, have completed and delivered 14 two, four and six-cylinder Marine Polar engines, total B.H.P. 7,280. In course of erection 8 six-cyl. engines of 4,000 B.H.P.

B. A. Hjorth & Co., Stockholm, have built "Avance" crude oil engines of 8 to 320 h.p.

BELGIAN.

Beliard, Crighton & Co., Antwerp.—Of the sea-going vessels repaired in the Antwerp City Dry Docks, during 1910, Messrs. Béliard, Crighton & Co. repaired 135 vessels out of a total of 317; in 1911, 155 vessels out of 339; in 1912, 168 vessels out of 307; and during ten months of 1913, 119 vessels out of a total of 249.

Usines Carels Freres, Ste. Anon., Ghent.—Vessels launched containing this Diesel type of engine are given under the names of the various Licensees. In addition two 6-cylinder engines, each developing about 2,200 I.H.P., are in course of construction for the British Admiralty, and a 400 B.H.P. engine for the German Navy.

Widenhorn & Korn, Ghent.—Have fitted the W-K patent marine gas producers in a number of vessels built by various builders.

AUSTRIA.

Austriaco Lloyds Steam Navigation Co., Trieste.—The building of ships and engines no longer takes place at this yard. The premises have been turned into a large repairing establishment.

WEST INDIES.

St. Thomas Dock Engineering and Coaling Co., Ltd., St. Thomas, have on hand the following repairs:—Machinery of cable steamer Harry Holmes, the dredger St. Hilda, and hull of the barge Elizabeth.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Notable Events.—A number of notable events concerned with the launching and the trial trips of important vessels has characterized the doings of Clyde shipbuilding and engineering firms since last month's notes were penned, and especially so during the mid-portion of December. This applies to naval vessels as well as to a number of merchant vessels of the mail and passenger order and of the cargo-carrying type.

Of outstanding interest was the successful launch by Messrs. John Brown & Co., Clydebank, on December 15th, of H.M.S. *Tiger*, which is the largest, the swiftest and the most powerful armoured battle-cruiser yet designed for the British Navy. This notable unit in the upbuilding of the British Navy was laid down in June of last year, and has thus taken about eighteen months to bring to the launching stage. It was pointed out at the luncheon following the launch that, while eighteen months had been expended in building the vessel on the Clyde, a smaller vessel, but not very much different, built by a friendly Power, had taken only fifteen months to build.

No information of any definite or authoritative character was allowed to transpire at the launch of this notable vessel, but it was freely given out that her weight as she rested on the ways previous to launching amounted to 13,000 tons, which is understood to be the heaviest launching weight of any battleship consigned to the water from sliding ways. No side armour had been fixed to the vessel before launching, and the teak backing was visible all the length of the ship. Notwithstanding this apparent incompleteness the huge vessel looked "every ounce" her total launching weight which, of course, included the massive cradle construction which bore her to her "native element." For checking her progress in the water, after being fully water-borne, there were five check ropes aside, each attached at the landward end to a massive group of chain cables. This arrangement answered admirably, and the vessel, which from the moment of starting took close on sixty seconds in passing down the ways and becoming water-borne, was "brought to" in a thoroughly efficient way before exhausting the launching run, and immediately taken in charge by tugs, and towed under the crane on the west side of the builders' wet basin, where she has as companion on the east end of the basin the Cunard liner *Aquitania*, now undergoing completion.

In close juxtaposition, therefore, there is at present to be seen at Clydebank the largest British-owned Atlantic liner and the largest, and what will be the swiftest, warship in the world. These two vessels alone account for 73,500 tons of shipping produced by the firm in one year, thus constituting a record as no other firm has combined in two vessels such enormous tonnage in one year's output. It may be here added that last year Messrs. John Brown & Co. created a world's record in marine engineering with a total of 178,500 i.h.p., while this year they set up a new record with a total of 230,000 i.h.p.

Messrs. Barclay, Curle & Co., of Whiteinch and Elderslie, also on December 15th launched from their west or Elderslie yard, about a mile further down the Clyde than their shipyard at Whiteinch, the first vessel which they have constructed there, *viz.*, the *Bandra* for the British India Steam Navigation Co. The vessel, although about only 340 ft. in length, has been constructed on one of four new building berths of 600 ft. length which have been laid out at the east end of the Elderslie establishment. It will be seen that the new yard is fully equipped for the construction of steamers of much greater size, although it is probable that, for a time at least, the firm will continue to build their larger vessels at their old yard at Whiteinch. As the Elderslie works have a riverside fitting-out berth, and include also the graving dock which was taken over as a going concern from the trustees of Messrs. John Shearer & Sons, and as, besides, they have been laid out on the most modern lines, they are admirably adapted for dealing with steamers of this type, and for the construction of vessels up to at least 600 ft. in length.

Messrs. William Beardmore & Co., Ltd., Dalmuir, who were so prominently in evidence during November through the launch from their works of H.M.S. *Benbow* and the simultaneous laying down on the same berth of the keel of the *Ramillies*, a still larger battleship, contributed to the notable events of December, in that they put through her speed trials the new Allan liner *Alsatian* of 18,000 tons. This vessel and her sister ship, *Calgarian*, now nearing completion by the Fairfield Company, will be the largest and fastest steamers in the Canadian service. As a result of the speed trials of the *Alsatian* on December 16th, she attained on the measured mile at Skelmorlie a maximum speed of 20·48 knots, this being, it is stated, almost 1½ knots in excess of the contract stipulation.

The Year's Doings.—Absorbing the whole interest in recent doings, however, is the subject of the aggregate volume of industrial output during 1913, and the outstanding features of individual productions. On these heads the reader can safely be referred to the elaborate statistics of the whole world's, as well as of the Clyde's doings, given in another part of this issue. What follows is mainly concerned with the new orders booked since last month's notes were penned, and a vague forecast of the work on hand and in prospect.

Messrs. William Simons & Co., Renfrew, whose tonnage output during 1913—amounting to over 11,000 tons—has, as usual, consisted entirely of dredgers of various types and of hopper barges, launched the last item of their output on November 28th, the sand-pump dredger *Cormorant*. The firm have still a fair amount of work on hand and have recently received a contract for the construction of a dredger for the Chenderiang Valley Tin Dredging Company.

Messrs. Fleming & Ferguson, Paisley, and Messrs. John Fullerton & Co., of the same busy town on the Cart, added to their year's output in December. The former firm launched a 1,200-ton steam hopper, which they have built to the order of the Clyde Lighthouse Trust, and similar to one presently on the stocks, for the same body, while the latter launched a screw steamer of 830 tons for the coastal trade of Liverpool owners, which is the first of four vessels on hand for the same owners.

Scott's Shipbuilding and Engineering Co., Greenock, have recently booked the contract for an additional steamer for the Cunard Company, 520 ft. in length, and of the same general type as the *Alaunia* and the *Andania*, produced for this company recently, and like them intended for the Canadian intermediate service. For the Cunard Company also, the Scott firm have at present on the stocks an intermediate steamer for the Mediterranean—New York service, which is to be propelled by geared turbines.

Turbine Speed-Reducing Gear.—In our notes for October, reference was made to the fact that gear-cutting of helical wheels for adapting the speed of marine steam turbines to the economical speed of screw propellers was being taken up by Clyde marine engineering firms themselves—*e.g.*, David Rowan & Co., and the Fairfield Co.—instead of having the items supplied by the one or two outside firms who have hitherto met the demand. Another Clyde marine engineering firm have ordered and are about to install in their works plant for the purpose, *viz.*, Messrs. Denny & Co., Dumbarton. The plant is being supplied by the well-known machine-tool firm of Messrs. William Muir & Co., Manchester. Messrs. Denny & Co. are the fourth Clyde firm who have ordered such special gear-cutting plant. The installation ordered by Messrs. David Rowan & Co. was expected to be delivered before the end of December, and those ordered by Messrs. The Fairfield Shipbuilding and Engineering Co. and Messrs. John Brown & Co., Ltd., Clydebank, to be delivered early in the new year.

A Record for the Forth.—Messrs. Mackay Brothers, of Alloa, on the Forth, have executed some important contracts during the past year. One item indeed is, in respect of size and structural character, a decided record for the Forth. This was the steamer *Eupion*, 325 ft. in length and of 5,000 tons carrying capacity. She is a bulk oil-carrying vessel and the largest yet built on the Forth, besides being the first vessel constructed in the East of Scotland on the Isherwood system of longitudinal framing.

TEES AND THE HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. W. Harkess & Co., Ltd., are reported to have secured the contract to build a passenger boat of about 270 ft. long for Messrs. A. A. Embiricos & Co. for their Mediterranean trade. The engines and boilers will be supplied by Messrs. G. Clark & Son, Southwick Engine Works, Sunderland.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, have a large amount of work on hand. The large twin-screw steamer mentioned last month will be fitted with geared turbines to be built by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool. The boilers for the same will be made at the Middlesbrough works. They are also reported as likely to secure a cargo boat for Messrs. Furness, Withy and Co., West Hartlepool.

Messrs. Smith's Dry Dock Co. have a large amount of both old and new work on hand, altering, repairing, dry docking, etc. They have the s.s. *Umona*, *Peter Benoit* of Antwerp, *Aurrera* and others, undergoing extensive overhaul and repairs.

Messrs. Richardsons, Westgarth & Co., Ltd., have some very heavy boiler contracts on hand, and are reported to have secured the contract to supply the engines and boilers for a small cargo steamer building for Messrs. Furness, Withy & Co., Ltd., West Hartlepool.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. continue to be fairly busy and are reported as expecting to secure the contract for a cargo steamer that is required for early delivery.

Messrs. Craig, Taylor & Co. expect to secure an order they are tendering for. They have sold a cargo steamer building by them to Messrs. Houlder, Middleton & Co., London.

Messrs. R. Ropner & Son have a good amount of work on hand for both home and foreign account, and are likely to secure an order for a cargo steamer that is in the market. Although enquiries keep fairly numerous the placing of orders is falling off considerably.

Messrs. Blair & Co. have a number of orders on hand for steamers building on the Tees, West Hartlepool and the Wear, sufficient to keep them busy for nearly twelve months. Great improvements are being made by the Tees Conservancy Commissioners increasing the wharfage to enable vessels to land at any state of the tide.

West Hartlepool.

Messrs. R. Hardy & Co. have sold the s.s. *Fernlands*, 2,042 gross tons, to Messrs. James Mitchell & Son, Dundee, through the Shipping Agency, Ltd., for about £8,000. Messrs. Esplen & Co., Liverpool, as reported last month, bought the s.s. *Hambleton Range* of 6,700 tons deadweight, from Messrs. Furness, Withy & Co., and resold her to Messrs. E. Moss & Co., Liverpool, who have rechristened her s.s. *Tanis*. Messrs. Metcalfe, Simpson & Co. are reported as having sold the s.s. *Scandinavine*, 1,329 tons gross, for about £5,000 to Messrs. Matison, Limberg & Co., who have re-named her s.s. *Latwiga*.

Messrs. W. Gray & Co., Ltd., continue to be very busy at both the old and new yards. At the new yard Mr. Purvis, manager, has retired, and has been succeeded by Mr. Jones, junr., son of their head director. They are reported to have secured the contract to build a cargo steamer of about 6,300 tons deadweight for Messrs. Pandite Bros., Constantinople, for about £46,000, and to steam 10 knots at sea. They have completed the purchase from the Tees Conservancy Commissioners of 83 acres of reclaimed land on the north shore near the Seaton Zinc Works, with a river frontage of 1,500 ft., which will enable them to build steamers that cannot be built at their other yards.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are busily employed on both old and new work. They are reported to have secured two small cargo steamers to build for Messrs. Furness, Withy & Co., of about 3,000 tons deadweight.

The Central Marine Engine Works of Messrs. W. Gray and Co. Amongst the new orders are the engine and boilers for the boats to be built, as mentioned above.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton Yard, are very full with work. Amongst the new orders are two cargo steamers of about 6,000 tons deadweight for Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for delivery about May or June.

Messrs. Richardsons, Westgarth & Co., Ltd., recently secured the contract to supply the engines and boilers for two large cargo and passenger steamers to be built by the Northumberland Shipbuilding Co. for Messrs. Furness, Withy & Co.; also the engines and boilers for the two steamers to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co. for the same owners.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Humber Oil Depot.—A huge oil-distributing depot, which is now under construction on the banks of the Humber, will, when completed, be the largest in the North of England. Its position is at Saltend, near Paull, a few miles from Hull. Fuel and other oils will be brought from Mexico and other countries in tank steamers of from 5,000 to 8,000 tons, and these will discharge at a jetty, now completed, which projects 1,500 feet into the river Humber. More than twenty large oil storage tanks, some of a capacity of 5,000 tons, are being constructed, into which the oil will be pumped direct from the tank-steamers. The North Eastern Railway Company are the promoters of the scheme.

Wireless Telegraphy for Trawlers.—Messrs. Hellyer, trawler owners of Hull, have fitted up the *Columbia*, *Bardolph* and *Caliban* with wireless telegraphy. The adaptation of wireless to the use of fishing fleets may be demonstrated in many ways. In the past it has always been a matter of difficulty to locate the fleet, which shifts its ground as circumstances determine. Under the present scheme, by the use of wireless it is thought much valuable time and expense will be saved. The fleet will be also able, amongst other things, to ascertain, if necessary, or be informed of the state of the Markets. Several other trawler companies contemplate following Messrs. Hellyer's example and gradually the system may be brought into general use.

Goole.—A strike has started among the deck officers of the Lancashire & Yorkshire Railway Company's steamers in port, at the time of penning these notes. Trouble has been brewing for some time. The mates in the Company's employ have asked for improved conditions, which shall include one shilling per day food money, as has already been granted the engineers, and the same rate of pay for moving ships in ports as the mates of the Hull and Grimsby steamers receive; as the demands were not granted, a large number of notices were handed in, the Company's action being to pay off the ships' crews and lay up their vessels.

Forty Years' Service.—Mr. F. Sommerscales, the general manager of Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, is retiring at the end of December after forty years' service with the firm. (See page 184).

Fish Dock.—Several trawlers are now undergoing very expensive repairs, after the stormy weather of late. Two vessels have been lost with all hands, the *Angus* and *Desdemona*, both belonging to Messrs. Hellyer's fleet. This has caused great gloom in many families in West Hull. The Government sent out a gun boat to scour the seas for the missing vessels, but it has returned without tidings of them.

Hull Shipping.—The trade in the various docks during December has been fairly busy, and the export of coal has been always on the steady increase. The amount of coal shipped from Hull during the year is 7,000,000 tons. All quay space on the docks is crowded with timber from the Baltic. The R.M.S.P. *Cardiganshire*, a new vessel of 15,000 tons, loaded part cargo for the Far East and proceeded to London to finish loading; she is the largest and most up-to-date modern vessel that has ever entered the Hull Docks, and has superior accommodation for passengers, and is well fitted up for emigrants.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are still keeping busy, building trawlers, for Hull, Grimsby, Boulogne, Cork and Fleetwood, and expect to be fully employed to the

spring of 1915. This firm has now several small steamers fitting out at the Hull Docks, receiving boilers and machinery, and preparing for trial-trips.

Messrs. H. Scarr & Sons, shipbuilders, Hessle, have work on hand for the Humber Conservancy and are building various tugs and lighters.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are keeping exceedingly busy in all departments with new boilers and engines for trawlers, tugs, coaster, and machinery and boilers for a new vessel building at Dundee for the Wilson Line of Hull; the works and outside staff are busy with general repairs, also fitting out trawlers with engines and boilers and all machinery connected with such vessels; their branch shops are also very well employed.

Messrs. Central Dry Dock Co., Ltd., have a number of general repairs on hand and are also opening out boilers and machinery for B. C. & Lloyd's Survey. Their own dock has the s.s. *Jessie* undergoing very extensive repairs, the vessel having been ashore and sustained much damage.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, are exceedingly busy in all departments, working night and day to compete with the orders in hand. A large number of orders have been received for their patent compound steam winches, which are exceedingly powerful. The branch shop at Alexandra Dock is very busy with general repairs, and opening out boilers and machinery for B. C. & Lloyd's Surveys. Enquiries for graving dock repairs are plentiful.

Messrs. Stewart & Craig, engineers and repairers, have been very busy amongst the steamers in the several docks, with graving dock work, and the usual opening out of boilers and engines for surveys.

Messrs. Cooper & Co., Ltd., engineers and ship repairers.—Repair and general work has not been so plentiful during the last month as it usually is. The moulding shop has been fairly busy with general castings, and several orders, local and foreign, have come in for their patent propeller. The firm's graving dock has been fairly well employed with coasting steamers and tug boats undergoing repairs.

Thomas Tate, Clarence Engine Works, has had a record year for general repairs, etc. S.s. *Pilot* has had expensive repairs effected, new propeller fitted, repairs to rudder and bulwarks; s.s. *Taffy*, boilers and engines opened out for Lloyd's Survey, new tail shaft and propeller fitted; s.s. *Owan Tudor*, deck and engine repairs; tug *Jubilee*, boiler retubed, also repairs effected to tugs *Tyre*, *Stanley* and *Kimberley*.

Messrs. Woodall & Co., engineers, have had a fair amount of repair work amongst Danish, Swedish and Norwegian steamers. The different departments are well employed. The smithy is working on L.C.C. forgings, stems and forgings, and rudder posts for small shipyards throughout the country. Several sets of the Company's patent cargo blocks for local and other steamship companies are being finished.

Messrs. The North East Coast Engineering Works (Hull), Ltd., engineers and ship repairers, have had a fairly busy month on the following steamers:—s.s. *Bramley*, s.s. *Exmouth*, s.s. *Diadem*, s.s. *Swanbridge*, s.s. *Fox*, tug *Winchester* and the R.M.S.P. *Conway* and *Parana*, extensive repairs having been done to several on deck and below. Several enquiries from owners for extensive repairs and graving dock work have been received. This establishment is close to the gates of Alexandra Dock and of easy access to the dry docks.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Southampton.—Last month the new steamer *Koningin Emma* of the Netherlands Steamship Co. called here on her maiden voyage to the Dutch East Indies. She is the largest vessel yet constructed in Holland and is 470 ft. long and has a displacement of 14,350 tons. Accommodation is provided for two hundred and sixty-nine first and second-class, thirty-four third and one hundred and forty fourth-class, and she has a crew of two hundred, so that she carries a total of six hundred and forty-three souls. It is announced in the local press that the British Seafarers' Union have decided to admit members of the victualling staff as a result of repeated requests from the stewards sailing out of this port. Admission is to be on the same terms as other members of the Union. A branch of the Ships' Stewards and Cooks' Union has been established here for some time, but has not met with the success anticipated, especially since the Transport Workers' strike of 1912.

Repair Work at Southampton.—Messrs. Thornycroft have been successful in securing the contract for the extensive repairs to the steamer *Izaston*, which will be carried out here. There was keen competition for the job, and it was assumed that she would go north, having been built at Blyth. The vessel was ashore in the Baltic, and after examination in dry dock it was found that very extensive repairs would be necessary before she again takes up her service. The *Scotsdyke*, which was on fire off the Isle of Wight, after being temporarily patched up here proceeded to Sunderland, but was on fire again shortly after leaving this port. Messrs. Harland and Wolff are very busy with the Red Star liner *Zealand*. The repairs and alterations will occupy about three weeks. They have the *Olympic* in hand for docking and overhaul, also Lord Pirrie's yacht *Valiant*, and Sir Thomas Lipton's *Erin*, both of which are to make cruises early in the New Year.

The R.M.S.P. Co.—On the 16th of last month the *Chignecto*, the last of the four steamers to be engaged in the Canada-West Indies Service, left this port for St. John's. The Company's new steamer for the Brazil and River Plate Service, the *Alcantara*, has been towed round from the Harland & Wolf's yard on the Clyde to Belfast to receive her engines. Considerable prominence has been given in shipping papers to this towing feat, considering the size of the ship and the distance of the tow. The *Alcantara* is 570 ft. long with 67 ft. beam and like the Company's *Arlanza*, will be fitted with "combination machinery," *i.e.*, triple expansion reciprocating engines on the wing shafts, and a low-pressure turbine on the centre shaft.

The *Cardiganshire*, a new twin-screw steamer for the Company's Far East service, sailed from London on the 20th of last month. A sister vessel, the *Carnarvonshire*, was launched from the yard of Messrs. Workman, Clark & Co., on the 18th of the month. She is expected to take up her position in the service next March. Both vessels are 500 ft. long with a gross tonnage of 9,400 tons, and by the same builders.

New Canadian Steamer.—The Cunard Company have placed an order with Messrs. Swan, Hunter & Wigham Richardson, for a new vessel to be called the *Aurania*. She will be engaged in the Company's Southampton service to Canada which commences in March next. She is a sister ship to the *Andania* and *Alaunia* and will carry second and third-class passengers only

THAMES.

(From our Own Correspondent.)

The Port Authority.—Several matters of importance connected with this body have occurred during the month. One is the retirement of the general manager, which takes effect at the end of the year. The changes that have been brought about have largely been under the control of Mr. Phillipson. The revision of charges has been an important matter and one which is not completed. Then the alterations and extensions to the docks themselves have entailed large expenditure. If we turn to the fourth annual report we find that the trade of the port has greatly increased during the year 1912-13 by upwards of £15,000,000, though there was a nett decrease of shipping of 986,849 tons, due to the labour troubles during the period. From the figures given London leads other centres in the total of imports and exports and it would seem with the improvements taking place she is likely to do so for many years to come. The balance of nett revenue carried forward is £89,637. During the year contracts relating to new works have been given out to the extent of two and a half million pounds sterling, and the whole of the works authorized are in hand. Almost the latest matter to record in connection with the Authority is the issue of a new loan of £1,000,000 Port of London Stock issued at 92 and carrying 4 per cent. The present issue is for carrying out the improvements authorized or which may be determined on as the trade of the port justifies.

International Conference and Lloyd's Register.—Lloyd's Register have added, as was appropriate, another to the

receptions given to the International Conference on Life-saving, and their commodious premises in the city welcomed about 450 guests, the chairman, Mr. J. L. Devitt, receiving them. Practically the whole of the delegates were present and the general company included Lord Strathcona, Lord Inchcape, Lord Southwark, Sir John Thornycroft and Sir Philip Watts.

The Naval Volunteers.—This body is familiarized to us by the *President*, the training ship lying off the Victoria Embankment. The London Division of the Corps has a present strength of 842 and the evolutions carried out at the recent prize-giving were highly praised by Prince Louis of Battenberg, who made the distribution recently at the headquarters in Commercial Road, Lambeth. It is proposed, according to Admiralty plans, on mobilization to send a detachment of these volunteers to each ship in the fleet and so make the body an integral portion of our naval forces.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

Messrs. Cammell, Laird & Co., Ltd.—H.M.S. *Iron Duke* completed her trials on November 26th and returned to Portsmouth for completion. These trials were successful in every respect and reflect great credit on the builders of the machinery, Messrs. Cammell, Laird & Co. The special destroyer *Garland* has left for commission. The keel of H.M.S. *Caroline* will shortly be laid down on the berth to be vacated by the Large Canadian Train Ferry which is expected to be launched before the end of the year. The P. & O. steamer *Khyber* was launched on November 29th and is now completing in the Wet Basin. The *Khiva* will complete her steam trials and will be delivered about the New Year. An order has recently been placed with this firm for a larger Transatlantic steamer about 500 ft. long by Messrs. A. A. Embiricos on behalf of the National Steamship Co. of Greece. This vessel will carry first and second-class passengers, besides emigrants and is expected to have a sea speed of 16 knots. A similar vessel is now building in Birkenhead for the same owners. The Royal Mail Steam Packet Company have also placed an order for a Steam Meat Barge, similar to two vessels recently constructed. Great activity prevails in all departments of the works, including the repair department, the extensive repairs to the *Royal Edward*, having been completed, and the Irish Mail Steamer *Ulster* having been in hand for overhaul.

The Liverpool Refrigeration Co.—This firm have recently completed the order for the whole of the refrigerating machinery for the ship's provisions and magazine cooling of the *Iron Duke*. Orders for similar machinery are also in hand for H.M.S. *Marlborough, Revenge, Ramillies* and *Resolution*, also cruisers *Birmingham, Nottingham, Lowestoft, Royalist, Undaunted, Galatea, Comus, Inconstant* and *Champion*.

The North Wales Steamship Co.—This Company have recently placed an order with Messrs. A. & J. Inglis, Ltd., of Glasgow, for a fast geared turbine steamer. This vessel will have all the latest improvements and is expected to be delivered in time for next season's traffic.

The Canadian Pacific Railway Co.—The two 12,000 ton steamers now building for this Company are expected to be ready during 1914 and will be of the intermediate class, being 520 ft. long and of 15 knots speed, and will be named *Metagama* and *Messanahie*.

The Mersey Docks and Harbour Board.—Apropos of the recent entering of the *Mauretania* into the new Gladstone Dock for the first time, it is of interest to note that the Board intend to undertake additional work in this connection. The river entrance to the New Gladstone half-tide Dock is to be increased in length from 870 to 1,070 ft. at an estimated additional cost of £118,000. After consultation with Mr. Lyster, the late chief engineer, means were provided for reducing the extra cost to £50,000. Whilst leaving the landing stage on December 18th for New York, the White Star liner *Cedric* had her starboard quarters swung by the tide against the stage. The upper passenger gantry was struck, being nearly smashed to pieces. The *Cedric* proceeded undamaged.

The Cunard Line.—It is reported that this company have placed an order with Messrs. Swan, Hunter & Wigham Richardson, of Wallsend, for a steamer for the Canadian trade, similar to the *Andania* and *Aluania*. The name of the new vessel will be *Aurania*.

Trade of Liverpool.—During the year 18½ tons of shipping entered the Mersey, of which 14½ tons make use of the Board's docks. The Board of Trade returns give the value of the inward and outward trade as £391,452,372, of which the exports accounted for £202,910,073, all of which are record figures.

Liscard Sea Training Homes.—Capt. Alan Field, F.R.G.S., secretary, has received a letter from Mr. Marconi stating his appreciation of the fact that the boys are now being trained as wireless operators and at the same time accepting the office of honorary Vice-President.

The Marconi International Marine Communication Co.—This Company, whose Liverpool agents are Messrs. J. Chadwick & Sons, have for some time claimed that 90 per cent. of the British vessels equipped use the Marconi System, now state that 95 per cent. are so equipped. This is itself denotes the great extent to which this system has been adopted.

The Harrison Line.—Capt. James Turner, marine superintendent, is retiring owing to ill health at the end of the year. Joining the company's service in 1881 as a third officer, on account of the retirement of Capt. Gill in 1894, Capt. Turner was appointed superintendent. Capt. Frederick C. Raby has been appointed to fill the vacancy, having until recently commanded the Company's steamer *Colonial*.

Liverpool-Dublin Services.—The City of Dublin Steam Packet Co. are now resuming their Dublin service to this port. The L. & N.W. Dublin-Holyhead service has also been again put into operation. These services have been disorganzied for some fourteen weeks, due to the disastrous strike in the Irish Port.

Colgrave's Boat Lowering Gear.—In view of the recent test of this gear carried out in Liverpool, it is of interest to note that the White Star Liner *Cymric*, which left Liverpool for New York on Dec. 4th, has had this gear fitted to her davits. One special feature of the gear is the fact that it can be fitted to existing davits ; two men only are required to control and lower a boat with passengers and crew. Messrs. Bullivant are the manufacturers, whose local manager is Mr. Jonathan Armstrong, Crooked Lane, Liverpool.

The Great Lakes.—It is estimated that the loss owing to the severe storms early in November will exceed one million pounds sterling. The companies interested in the construction of dry docks on the Great Lakes, have petitioned the Government to increase the guaranteed interest from 3½ to 4¼ per cent. on a maximun of 5,500,000 dollars.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—The event of the month was the launch of the British super-"Dreadnought" *Emperor of India*, which took the water on the 4th of December at the hands of Lady Islington. The vessel is of the same type as the *Iron Duke*, and represents one of the latest class of battleships designed for the British Navy. The vessel took only about thirty seconds to glide down her ways, and her first curtsey in the water was the signal for vociferous cheering from the vast crowd assembled to witness the event. The *Emperor of India* is now berthed in the Buccleuch Dock, where she will receive her fitments for service, which will probably take about twelve months to accomplish. A strong effort will be made to complete the ship as quickly as possible, as some delay in her construction has been caused by strikes on the one hand and by a scarcity of skilled men on the other.

The Turkish Battleship "Reshadieh."—This battleship is also at the fitting-up wharf in the Buccleuch Dock, alongside the *Emperor of India*, and a vast number of men are

employed on both ships, as both the home and the Turkish Governments are anxious for as early a delivery as possible. Fortunately the engines and boilers of both ships are ready to lift on board, together with auxiliary machinery and all the various etceteras requisite for the fitting-up of ships like these.

Airships. The work of fitting up the works which have been laid down on Walney Island for the building of airships, and all classes of air craft, is proceeding with all the speed which is possible, as the firm are anxious to begin the construction of airships with the least possible delay. They have already been entrusted with orders from the Government to build four Parseval airships, and the material for these has been imported from Germany, the work of putting the airships together being therefore a somewhat simple matter. The plans for the new airship works include the building of an immense shed 540 ft. in length, 140 ft. in width, and a height of 96 ft. The great width will enable two rows of airships to be built at one time, and it will be easy to have under construction half a dozen airships in the shop at once. Accommodation has been made for the residence of about 200 men on the works regularly, so as to facilitate the construction of all classes of aerial craft, and to have men on the premiess at all times ready for any emergency which may from time to time arise. No time is being lost in getting these works ready at the earliest possible date, because the demand for aircraft at the moment is very pressing, and the firm want to oblige the Admiralty in every way they can. Experts are in charge of the business, and they will profit by the experience already had on the Continent and elsewhere, where the most successful airships have been built. Quite a large number of men are already at work on Walney Island, and it is anticipated that before long some product of the marked enterprise will present itself. The site of the aviation works is especially good, as there is any amount of accommodation in the great and open area surrounding the sheds.

Work in Progress.—Very marked progress has been made in the orders for ships in the hands of the Vickers' firm during the past month, and now that the *Emperor of India* has been launched there is room for another large warship to go down on the same ways. Nothing has yet been heard officially of any new order coming forward, but it is known that Messrs. Vickers, Ltd., have in progress of negotiation some very important work, which is expected to come to Barrow very shortly. Some rumours of a depression having set in in the shipbuilding trades have been abroad lately, but there is no prospect, so far as Barrow is concerned, that any falling off of work will be experienced for some time to come. It is expected that later on a big order will come to hand from Japan, but nothing official can be obtained as to this matter. The work of building the two light cruisers for the Admiralty, the *Phaeton* and *Penelope*, is now proceeding very quickly. Many of the gangs of men were employed in getting the *Emperor of India* ready for launching. It is now found possible to get on with other important work in the yard, and if it were possible to get hold of the services of more skilled men there is plenty of work for them. This work is proceeding as quickly as possible. The submarine department is quite full of work for the Admiralty, and some of the craft in course of contruction will make a marked advance on any sub-aqueous vessels yet built.

New Developments.—During the month further developments of the Vickers' firm have been made officially known. The firm, along with Sir Wm. Armstrong, Whitworth & Co., have signed an agreement with the Ottoman Government for the resuscitation of the shipbuilding yard at Constantinople, where they will build warships for the Ottoman Empire and also construct mercantile ships. This will mean a deal of work for the two firms in this country. Again, it is officially stated that Messrs. Vickers have also been granted a concession by the Russian Government for the building of up-to-date gun factories and armaments works in Russia, for supplying material for the warships building in the Black Sea. Again, it is also officially stated that arrangements have been made by Messrs. Vickers, Ltd., to erect large works in Canada for the construction of guns and armaments for ships built by the Vickers' firm in the Dominion. There seems to be no end to the determination of the firm to open up branch establishments abroad.

BELFAST.

(From our Own Correspondent.)

The Year's Work.—As will be seen from the Annual Returns, the output of new tonnage from the yards on the Lagan falls considerably short of the figures for the past few years; but, as pointed out in last month's notes, this drop is not to be attributed to any falling off in shipbuilding activity. During 1913 every available slip in Messrs. Harland & Wolff's and Messrs. Workman, Clark & Co.'s yards has been occupied, and the order books of both firms indicate that the present brisk state of trade will continue for a long period. The vessels launched represent tonnage of the highest class, and include such notable vessels as the Pacific Steam Navigation Company's mail steamers *Andes* and *Orduna*; the Holt liners *Ulysses*, *Eumaeus*, and *Phemius*; and several of the latest type of fruit steamers. The year 1914 will be an extremely busy one, and the figures for that period will in all probability constitute a record for the port.

Messrs. Harland & Wolff.—A big effort is being made to launch the Aberdeen liner *Euripides* before the end of the year, and work is proceeding night and day with a view to accomplishing this object. There has for some time past been a great scarcity of men, especially riveters, and squads have had to be withdrawn from other vessels to push on the *Euripides* to the launching stage. Two of Messrs. Harland and Wolff's Clyde-built steamers have arrived in Belfast for their machinery during the month. These are the Royal Mail Steam Packet Company's *Alcantara*, and the Atlantic Transport Company's *Missouri*. The former vessel, which is 600 feet in length, will be propelled by the now well-known "Combination" system. The *Missouri* is a single-screw steamer, and is a sister-ship of the *Maryland*—also built on the Clyde and engined in Belfast—which was completed and left the port a few weeks since. Messrs. Harland & Wolff's output from the Queen's Island yard during the past twelve months is, for reasons already referred to, considerably less than it has been for many years; but taken in conjunction with the vessels launched from their Clyde yards, the aggregate tonnage reaches a highly respectable figure, and next year a breaking of all previous records may be confidently looked for. In February they will have, including vessels launched from their Clyde yards, seven steamers fitting out on the Lagan, amongst which will be the White Star leviathan *Britannic*. No official announcement has as yet been made regarding the launching date of this notable vessel, but the present arrangement is to put her in the water some time in February. In addition to these seven new steamers, Queen's Island firm will that month have two big repair jobs in hand, so that a period of unprecedented activity is assured.

Messrs. Workman, Clark & Co.—At the time of writing the output figures for the various yards in the United Kingdom are not before the public, but the above firm will be found to occupy a high place on the list. They have been considerably hampered in their operations during the past twelve months, owing to the collapse of the 100-tons harbour crane, which has necessitated their using Messrs. Harland & Wolff's big floating crane for engining their steamers. This crane being, of course, only available at such times as Messrs. Harland and Wolff were not using it themselves, the launching of more than one of Messrs. Workman, Clark & Co.'s steamers has been delayed. Unfortunately the existing unsatisfactory state of affairs in this connection will continue for some time, and difficulties will be increased with the large volume of new tonnage which will be afloat at the fitting-out wharves early in the new year. On 18th December, Messrs. Workman, Clark & Co. launched the twin-screw steamer *Carnarvonshire*, which is a sister-ship of the *Cardiganshire* put in the water for the Royal Mail Steam Packet Co. in September.

Messrs. MacColl & Co., whose principal work is repairs, have been fairly well occupied during the year, and have at present in hand a set of triple engines for a coasting steamer.

Londonderry. The North of Ireland Shipbuilding Company have been well supplied with orders, and amongst other vessels building on their stocks, they have a steamer of 8,000 tons which will be the largest vessel yet built in the port.

Dublin.—The Dublin Dockyard Co. have also had no reason to complain of the year's work, and are fairly well booked up.

THE BRISTOL CHANNEL.

(From our Own Correspondent.)

The general amount of work in hand during the past month has been somewhat below the average, but at the same time a few of the larger establishments have no reason to complain of the volume of work forthcoming. Especially does this concern the Mountstuart Dry Docks, Channel Dry Docks, and Messrs. C. H. Bailey.

Mountstuart Dry Docks. This establishment has been working at full pressure during the entire month on several extensive repair jobs as well as on a large amount of other work of lesser magnitude. The work in hand included the heavy bottom damage to the *Den of Mains*, which will yet take some time to complete, an extensive general overhaul to steamer *Rakaia*, and general repairs to steamers *Julia Park*, *Idenwen*, *Bankdale*, *Strathcarron*, etc.

The Channel Dry Dock and Pontoon Co. and its sister concerns at Barry, Newport and Sharpness were also well engaged on work of fair importance, the steamers dealt with including *Putney Bridge*, *Emerald Wings*, *Fishpool*, *Corby*, *Domingo de Larrinaga*, *Caroni*, *Beacon Grange*, *Woodfield*, *Zone*, etc.

Messrs. Elliot & Jeffery, Hill's Dry Docks, Junction Dry Docks, Messrs. Shearman and T. Diamond & Co. were all moderately engaged, no special sign of activity being apparent.

Barry Graving Dock and Messrs. C. H. Bailey were actively employed on general repairs, the Graving Dock Co. completing work on the steamers *Zanani*, *Newholm*, *Kilkerran*, *Ariadne*, *Dunbarmoor*, *Castleford*, *Penrith Castle*, *Exmoor*, *Kincraig*, *King George*, etc., while Messrs. C. H. Bailey were engaged on *Thirlwall*, *Glenalmond*, *Tonbridge*, *Purley*, *Cardiff Hall*, *Gretavale*, *Glentrum*, *Pelham*, *Aldersgate*, *Reindeer*, *Longbenton*, *Sturton*, etc.

Penarth Pontoon Co. are engaged on the reconstruction of the Penarth Slipway, so that repair work may be dealt with more effectively and rapidly when the pontoon is engaged

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Armstrong, Whitworth & Co., Elswick.

ALMIRANTE LATORRE. November 27th. Chilian first-class battleship. The largest vessel yet constructed by Messrs. Armstrong, Whitworth & Co., and also the largest vessel yet launched for the Chilian Navy. She is the first of two which the firm are building. Each is of 28,000 tons displacement, or about 500 tons more than the *Rio de Janeiro*, which was launched for the Brazilian Navy at Elswick in January. Sir Andrew Noble, speaking after the launch, said the vessel was the ninth war vessel constructed by the firm for the Chilian Government. The first was the *Esmeralda*, of about 3,000 tons, built in 1884. A tenth vessel, the *Almirante Cochrane*, a sister to the *Latorre*, was at present on the berth adjoining that vacated by the *Latorre*. The whole of the armament and armour plate for both vessels are being manufactured by Messrs. Armstrong.

SAN ISIDORO. December 17th. Tank steamer built to the order of the Eagle Oil Transport Co., Ltd., of London. Principal dimensions as follows:—Length overall 548 ft., length between perpendiculars 530 ft., breadth extreme 66½ ft., depth moulded 41½ ft. to shelter deck. Propelling machinery of the quadruple-expansion type will be provided by the North-Eastern Marine Engineering Company, Wallsend. The cylinders are 28½, 41, 58 and 84 in., with a stroke of 54 in. Steam will be supplied by four cylindrical boilers designed for a working pressure of 220 lbs., and arrangements are made for burning liquid fuel. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Solution has been applied throughout the ballast tanks and bunkers and their Patent "Bitumastic" Covering to the tank tops. The vessel has been built to Lloyd's highest class on the Isherwood system of longitudinal framing, and has a complete shelter deck. The shelter 'tween deck space will be empty when oil cargoes are carried. The oil is carried in twelve holds, which are divided longitudinally by an oil-tight bulkhead, and separated from the remainder of the vessel by cofferdams. A central expansion trunk of the usual form is provided between the main and upper decks, and extends for the full length of the lower holds. The spaces at the sides of the main expansion trunk are utilised for carrying oil or fuel, and are provided with separate expansion trunks extending through the shelter 'tween decks. The necessary supply of fuel oil for the boilers is carried in a large cross bunker aft, in a deep tank forward, and at the sides of the main expansion trunk. This arrangement materially simplifies the trimming of the vessel, as the centre of gravity of the ship is not then greatly affected as the fuel is consumed. A large towing winch is fitted aft for towing ocean-going oil barges.

The ventilation throughout is mechanical, and includes large fans and special arrangements to ensure safety in connection with the oil burning apparatus. The oil fuel pumps are located in an isolated pump room. The oil-pumping installations in these vessels are the largest ever fitted on oil-carrying steamers, and are specially adapted for dealing with heavy oil. The pumps are located in two pump rooms, and an arrangement of heating coils is fitted in the oil holds on the most up-to-date principle. Marconi wireless telegraphy installations are provided. Messrs. Sir W. G. Armstrong, Whitworth & Co. built in 1889 the tank steamer *Gluckhauf*, which was the first steamer to cross the Atlantic with a cargo of oil in bulk.

John Blumer & Co., Sunderland.

JEDMOOR. Screw steamer built for Messrs. Walter Runciman and Co., of Newcastle and London. Single-deck type, with poop, bridge and forecastle, and will carry about 5,500 tons on a light draught.

KELSOMOOR. December 13th. Steamer, built to the order of Walter Runciman & Co., of Newcastle and London. The *Kelsomoor* is of the single-deck type, with poop, bridge and forecastle, and perfectly clear holds, to carry about 5,500 tons on a light draught. Water ballast is provided in the double bottom and also in the after-peak tank. The discharging gear is thoroughly up-to-date and specially arranged for dealing with heavy cargoes. She will be engined by the North-Eastern Marine Engineering Co. at the South Dock, and the winches and steering gear will be fitted by Messrs. John Wigham & Son, of Hylton.

Blyth Shipbuilding and Dry Docks Co., Ltd., Blyth.

ELSDON. December 14th. Steel screw steamer, built to the order of The Sharp Steamship Co., Ltd. (Messrs. Sharp & Co., Newcastle-on-Tyne, managers). The vessel, which measures 255 ft. in length, with a beam of 37 ft. 3 in., has been constructed under special survey for Lloyd's highest class, and is of the raised quarter-deck type, having short bridge and topgallant forecastle. She is adapted specially for the coal and wood trade, with extra large self-trimming hatches and clear holds, and has thoroughly up-to-date equipment of deck machinery. Triple-expansion engines will be supplied by Messrs. The North-Eastern Marine Engineering Co., Ltd., Sunderland. During construction the hull and machinery have been under the supervision of Messrs. Jos. R. Scott & Son, Newcastle-on-Tyne.

Doxford & Sons, Ltd., Sunderland.

SAN JERONIMO. December 13th. Built to the order of the Eagle Oil Transport Co., Ltd., of London, and having a length of 540 ft., a breadth of 66½ ft., and a depth of 34 ft., her draught being 26 ft. The vessel has four boilers of 16 ft. 3 in. by 12 ft., with a pressure of 220 lbs.

Sir James Laing & Sons, Sunderland.

SAN JOAQUIN. November 14th. Oil-carrying steamer built to the order of Mr. Wilh. Wilhelmsen of Tonsberg, Norway, through Messrs. H. E. Moss & Company, of Liverpool, Newcastle and London. The *San Joaquin* is intended for the oil trade in the Pacific, and is the largest oil carrying vessel which has hitherto been launched on the Wear. Dimensions are as follows:—Length 425 ft., B.P., breadth 57 ft., depth moulded 33 ft., and carrying capacity over 10,000 tons. The vessel is constructed on the Isherwood longitudinal system, and to the highest class at Lloyd's with special survey, and has a long poop covering the machinery space and bunkers, bridge amidships and topgallant forecastle. Oil is carried in nine double tanks which are separated

from bunkers and cargo hold by oil-tight cofferdams. Provision is made for water-ballast in double bottom under engines and boilers, after peak, as well as in the deep tank forward, which is also adapted for oil fuel. The bunker capacity is specially large, and arranged for either coal or oil fuel. The propelling machinery, which will be supplied by Messrs. George Clark, Limited, consists of a set of triple-expansion surface-condensing engines having cylinders 27 in., 45 in., 74 in., with a stroke of 54 in., steam being supplied from four multitubular boilers 13 ft. 9 in. by 11 ft. 9 in., working under forced draught. The oil burning apparatus will be by the Wallsend Slipway Company to their best practice.

The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

TIRRENO. November 22nd. Steel screw steamer built to the order of Messrs. The Societa Anonima di Navigazione a Vapore "Lussino" of Lussinpiccolo, Austria. Dimensions about 420 ft. in length and 53 ft. beam, with two complete steel decks, including the shelter deck all fore and aft, with a cargo-carrying capacity of 8,400 tons. Constructed in the most up-to-date manner, *viz.*, on the deep bulb-angle frame principle, she has clear holds and is a first-class vessel. A large quantity of water ballast is carried in the cellular double bottom deep tank and large after peak. The shelter 'tween deck is of exceptional height and is so arranged that a large number of emigrants can be carried. Twelve derricks and ten winches are provided to ensure the most expeditious handling of cargo. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 26½ in., 44 in., 73 in. by 48 in., and three large boilers 15 ft. 6 in. by 11 ft., 180 lbs. pressure. During construction the vessel has been superintended by Messrs. Rusden & Baird on behalf of the owners.

Osbourne, Graham & Co., Hylton.

WINGATE. December 13th. Steel screw steamer built to the order of Messrs. Furness, Withy & Co., Ltd., of West Hartlepool, and the seventh vessel constructed by these builders on the Monitor principle. The principal dimensions are 290 ft. long by 40 ft. 1½ in. broad, and the vessel is of the single-deck type, and carries 3,350 tons on a shallow draught. She has been constructed to British Corporation survey, and is fully equipped with the most modern deck appliances. Engines will be supplied by the North-Eastern Marine Engineering Co., designed to drive the vessel a speed of 10 knots. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bilges, engine and boiler-room tanks, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

Palmer's Shipbuilding and Iron Co., Jarrow-on-Tyne.

SAN VALERIO. November 14th. Oil tank steamer built to the order of the Eagle Oil Transport Company, Ltd. The vessel, which is 420 ft. long, and will carry about 9,300 tons deadweight, has been built on the Isherwood system of framing to Class 100 A1 Lloyd's special survey, and in accordance with Suez Canal requirements. The steamer has ten pairs of oil compartments, with an expansion trunk running the whole length between main and upper decks, with summer tanks arranged for coal or oil fuel at sides. Accommodation is provided for captain and officers inside and on top of the bridge-deck, with Marconi room and chart and wheelhouse above. The vessel is to be fitted by the Palmer Company with quadruple-expansion engines, for which steam will be supplied by three large single-ended boilers arranged for burning oil fuel and working under forced draught at a pressure of 220 lb. per square inch. The trials run recently were satisfactory in every way, the contract speed of 11 knots being exceeded.

SAN HILARIO. November 27th. One of the ten large vessels being constructed on the North-East Coast to the order of the Eagle Oil Transport Co., Ltd. The vessel, which is to be employed in the transport of oil from Mexico, has an overall length of nearly 550 ft., and she will carry a total deadweight of over 15,000 tons. She is constructed on the Isherwood system of longitudinal framing, to Lloyd's highest class for the shelter-deck type, and under their special survey for the carriage of oil in bulk. The oil is carried in twelve main compartments, sub-divided by a centre longitudinal oil-tight bulkhead, having the usual cofferdams. The boilers are arranged for burning oil, the necessary supply of liquid fuel being carried in a large cross bunker aft, a deep tank forward, and at the sides of the main expansion trunk, in order to facilitate the trim of vessel as fuel is consumed. A large towing machine, with cylinders 16 in. by 16 in., is fitted aft for towing ocean-going oil barges, and a powerful steam winch with extended ends is fitted at each mast. The machinery has also been constructed by Palmers' Co., and comprises a set of quadruple-expansion balanced engines, steam for which is supplied by four large single-ended boilers, arranged for burning liquid fuel, and working under forced draught at a pressure of 220 lb. per square inch. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the boiler-room tank and their patent "Bitumastic" covering to the tank tops.

Wm. Pickersgill & Sons, Ltd.

NEWLYN. October 30th. Built to the order of Messrs. J. J. & C. M. Forster, of Newcastle. Single-deck type with long bridge and built to take Lloyd's highest class, and is to be fully equipped in the most up-to-date manner for the rapid and efficient handling of cargo. Her engines and boilers are to be of ample power by Messrs. John Dickinson & Sons, Ltd., Sunderland. Mr. Lawther is superintending the construction of the vessel.

John Readhead & Sons, Ltd., South Shields.

ONWEN. November 27th. Steel screw steamer built to the order of Messrs. The W. & C. T. Jones Steamship Co., Ltd., Cardiff, and under Lloyd's highest class. The dimensions are 375 ft. by 51 ft. by 28 ft. 9 in. The vessel is of the improved single-deck type, with a deadweight capacity of 7,500 tons, with poop, long bridge, and topgallant forecastle, and large holds clear of beams, double bottom all fore and aft for water ballast, and water ballast also carried in fore and after peaks. She is fitted throughout for grain cargoes with steel centre line division bulkhead and feeders, large hatchways, powerful steam winches driven from a large donkey boiler of multitubular marine type, and double derricks for loading and discharging cargoes, the derricks being swung from tables and crosstrees on the masts. The vessel conforms to the latest requirements of the Board of Trade. Triple-expansion engines also constructed by Messrs. John Readhead & Sons, Ltd., will be fitted, having cylinders 25 in., 43 in. and 71 in., with 48 in. stroke, supplied with steam from three large steel boilers working at a pressure of 180 lbs. per square inch.

Short Bros., Ltd., Pallion, Sunderland.

KURDISTAN November 28th. Built to the order of The Hindustan Steam Shipping Co., Ltd., of Newcastle-on-Tyne. Leading dimensions are :—Length, 360 ft ; breadth, 50 ft. 10 in., and depth moulded, 25 ft. 8 in. She is built on the Isherwood principle, with single deck, poop, bridge and topgallant forecastle, to take Lloyd's highest class, and will carry a deadweight cargo of about 6,400 tons on a moderate draught of water. Ample water ballast is provided throughout double bottom, and in fore and after-peak tanks, to enable the vessel to run in ballast with safety. Six water-tight bulkheads are fitted across the ship, and steel centre line bulkhead between hatches, with wood shifting boards for grain cargoes in way of hatches. The propelling machinery will be installed by Messrs. John Dickinson & Sons, Ltd., Sunderland, and consists of engines, with cylinders 24½ in., 40 in., 66 in. dia. and a stroke of 45 in., driven from two large multitubular boilers of 180 lbs. pressure. While under construction the hull and engines have been supervised by Messrs. Thompson & Eyres, of Sunderland.

Swan, Hunter & Wigham Richardson, Ltd., Neptune Works, Newcastle-on-Tyne.

ARUM. November 27th. Cargo motor vessel built to the order of the Flower Motor Ship Co., Ltd. (managers, Messrs. M. Samuel & Co., London). Dimensions :—Length b.p., 350 ft. ; breadth moulded, 47 ft. ; depth, 27 ft. ; mean draught of about 21 ft. 6 in., and she will carry 6,000 tons deadweight. The pumping arrangements are very complete. She has complete gear for handling cargo, including eight steam winches. Two Cochran (Annan) donkey boilers have been supplied fitted with patent seamless furnaces. The boilers will work under natural draught and are arranged to be heated by either coal, oil or the exhaust gases from the main engines. Oil fuel is carried in all the double bottom

tanks and also in fore and after-peaks, with special pumping arrangements. The vessel is fitted with twin-screw Diesel motors of the Polar type, working on the two-cycle principle, with four working cylinders on each motor and developing 1,150 b.h.p., built by Messrs. Swan, Hunter & Wigham Richardson, and possessing many special features of detailed improvements in the design. The *Arum* is being built to Lloyd's highest class and will have Suez Canal certificate. Spacious 'tween decks are provided, available for pilgrim traffic and military transport. Both hull and machinery are being constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam.

Joseph T. Thompson & Sons, Sunderland.

BATSFORD. December 12th. Built to the order of Messrs. Harris & Dixon, Ltd., of London. Principal dimensions are :—Length, 404 ft. ; breadth, 54 ft. 2 in., and depth, 36 ft. 7½ in. The vessel has been constructed to Lloyd's highest class, and is of the shelter-deck type, and has been designed to have a large deadweight carrying capacity on a moderate draught of water. Ten winches and ten derricks for dealing with the cargo will be fitted. A complete installation of electric lighting will also be installed. The propelling machinery has been constructed by Messrs. John Dickinson and Sons, Ltd., of Sunderland, the sizes of the cylinders being 27½ in., 44½ in., 74 in. by 48 in. stroke, supplied with steam by three large boilers working at a pressure of 180 lbs.

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Thornaby.

HEADLEY. November 27th. A shelter-deck screw steamer of the following dimensions, *viz* .:—415 ft. by 53 ft. 6 in. by 37 ft. 5 in., to shelter deck. She is built of steel to the highest class in Lloyd's registry, under special survey. Large water ballast capacity has been arranged for in double bottom fore and aft and in peaks, and she is fully equipped with all the latest and best types of special machinery for the general equipment usual for this class of steamer. The steamer has very large cubic capacity, and is fitted throughout with shifting boards, etc., for the carriage of grain. Her engines have been constructed by Messrs. Blair & Co., Ltd., 27 in., 44½ in., 73 in. by 48 in., three boilers working at 180 lbs. pressure. The vessel has been built for Messrs. Houlder, Middleton & Co., Ltd., for the Mitre Steamship Co., Ltd., London, under the superintendence of Captain R. A. Gray, marine surveyor, Newcastle.

Wm. Gray & Co., Ltd., West Hartlepool.

HACKNESS. November 27th. Steel screw steamer built for the London & Northern Steamship Co., Ltd., Messrs. Pyman Bros., London, managers. She is of the shelter-deck type, and will take the highest class in Lloyd's Register, and the dimensions are :—Length overall, 432 ft. ; breadth, 55 ft., and depth, 26 ft. 10 in. The hull is built with deep bulb-angle frames, dispensing with hold beams and leaving large clear holds, cellular double bottom and fore and aft-peak ballast tanks, ten steam winches, derrick tables and outriggers, double derricks at each hatch, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, fresh-water distiller, steam grain divisions, stockless anchors, telescopic masts, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 28 in., 45 in. and 75 in. dia., with a piston stroke of 51 in., and four large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. R. T. Rutherford on behalf of the owners.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

STANLEY. November 29th. Steel screw steamer built for Messrs. The Pyman Steamship Co., Ltd., West Hartlepool (Messrs. George Pyman & Co., managers). Dimensions are 387 ft. by 51 ft. 3 in. by 26 ft. 10 in. depth moulded, carrying over 7,400 tons on a moderate draught. She is built to Lloyd's highest class on the shelter-deck principle, having two complete steel decks, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame system, giving exceptionally clear holds for the stowage of bulky cargoes. Wood grain divisions are fitted throughout the holds to Board of Trade requirements, and the steamer is divided into seven water-tight compartments by six transverse bulkheads. Triple-expansion engines will be supplied and fitted by Messrs. Blair & Co., Ltd., Stockton-on-Tees, having cylinders 25 in., 42 in. and 68 in. by 48 in., with two large single-ended boilers and one auxiliary boiler, all connected up to the main engines, 180 lbs. pressure.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

NORTHERN COAST. December 13th. Steel screw modern cargo steamer constructed to the order of Messrs. Powell, Bacon & Hough Lines, Ltd., of Liverpool, etc. The dimensions are 259 ft. 6 in. by 36 ft. by 17 ft. 8 in. moulded depth with a deadweight carrying capacity of about 2,000 tons on a light draught of water. She is being built under special survey to the highest class of British Corporation and is of the single-deck type, with complete shelter deck all fore and aft and bridge and forecastle. The vessel will have two holds, three hatches, three masts, seven derricks, and will be equipped with seven steam winches, including three large McFarlane winches, steam windlass, hand and steam-steering gear, electric light, etc., and all the most up-to-date appliances for economical and efficient working of cargo. Triple-expansion engines having cylinders 18 in., 29 in. and 48 in. by 36 in. stroke, supplied with steam by two large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. The hull and engines are being constructed under the superintendence of Mr. W. L. Roxburgh. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, and their patent "Bitumastic" covering to the engine and boiler-room tank tops.

WOLVERTON. November 27th. Steel screw steamer, built to the order of Messrs. The Denaby and Cadeby Main Collieries, Ltd., of London, etc. The vessel is being built to class 100 A1 at Lloyd's and is of the single-deck type, with poop, bridge and topgallant forecastle. The principal dimensions are 372 ft. by 52 ft. by 26 ft. 3 in. moulded, and she will carry about 7,100 tons on a light draught of water. The vessel will have four large holds, five hatches, two masts, eleven derricks, and will be equipped with ten steam winches, steam windlass, hand and steam-steering gear and all the latest and most modern appliances for the rapid handling of cargo. Triple-expansion engines having cylinders 25 in., 40 in. and 67 in. by 45 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. George Clark, Ltd., Sunderland. The hull and engines are being constructed under the superintendence of Mr. W. W. Nicholas, of Messrs. Nicholas and Meek, Hull.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

BURDALE. November 26th. Steel screw steamer of the following dimensions :—Length overall, 394 ft. ; breadth extreme, 51 ft. ; depth moulded, 27 ft. 3 in. ; tonnage, gross, about 4,220 ; deadweight, about 7,560 tons. The vessel has been built to the order of Messrs. Burdick and Cook, of London, and will class 100 A1 in Lloyd's Register. She has been built under special survey, and is of the single deck type. A cellular double bottom throughout, and forward and after-peak tanks are fitted for water ballast, and equipment includes large horizontal multitubular donkey boiler, eight steam winches, steam-steering gear, steam windlass with quick-warping ends, stockless anchor, and all modern improvements for facilitating loading and discharging. The engines, by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42½ in. and 69½ in. by 45 in. stroke, steam being supplied by two single-ended boilers having a working pressure of 180 lbs. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, tanks, etc., and their patent "Bitumastic" covering to the tank tops.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

JACINTH. November 29th. Steel screw trawler. Dimensions, 121 ft. 8 in. by 22 ft. by 13 ft. moulded. Built to the order of The Kingston Steam Trawling Co., Ltd., Hull. The vessel will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

ANGELUS and ANDROMACHE. December 17th. Steel screw trawlers, the principal dimensions being 135 ft. by 23 ft. 3 in., by 13 ft. 1 in. moulded, and 136 ft. 8 in. by 24 ft. by 13 ft. 3 in. moulded, respectively. The *Angelus* has been built to the order of Messrs. White & Willows of Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull. The *Andromache* has been built to the order of Messrs. Buckworth & Mumby, Ltd., Cork, and powerful triple-expansion engines will be fitted by Messrs. Amos & Smith, Ltd., Hull.

NORTH-WEST OF ENGLAND.

Cammell, Laird & Co., Birkenhead.

KHYBER. November 29th. Launched from the Tranmere yard and built for the P. & O. Co. The *Khyber* is a vessel of 8,800 tons gross and has a speed of 14 knots. Drag anchors were used, which checked the vessel within a comparatively short distance, in order to prevent her striking the sunken Cork steamer *Rissa*.

Vickers, Ltd., Barrow-in-Furness.

EMPEROR OF INDIA. November 27th. Dreadnought *Emperor of India*. The vessel has a length of 580 ft., and will carry ten 13·5 guns and a number of 6-in. guns. She will have a speed of 22 knots and a displacement of 25,000 tons. Like other vessels of her class, she will use oil fuel in conjunction with coal. The vessel is coated throughout with Messrs. Briggs' bituminous enamels and solutions.

Maryport Shipbuilding & Repairing Co., Maryport.

RHENASS. Coasting steamer. 121 ft. in length, 22 ft. in breadth, and 10 ft. 6 in. in depth, has been designed to carry about 320 tons of cargo. The first boat launched by the Company.

SOUTH OF ENGLAND.

Edward Hayes, Stoney Stratford.

STEAM TUG. Single-screw steam tug, 56 ft. long, 12 ft. 6 in. wide, with a draught of 5 ft. extreme, for service in Indian waters. Fitted with a "Hayes" standard set of compound surface-condensing engines, having cylinders 8 in. and 16 in. by 10 in. stroke, and large marine return tube boiler, built to Lloyd's survey for 125 lb. w.p. The engine is controlled from deck, as well as in the engine-room, by specially designed gear. The cabins are specially designed to meet the requirements of a tropical climate.

LAUNCHES—Scotch.

Geo. Brown & Co., Greenock.

ARDGLASS. November 27th. Cargo steamer built for Messrs. Lang & Fulton, Greenock. The vessel is 200 ft. in length, 20 ft. in breadth, and of 15 ft. moulded depth. Engines designed to give a sea speed of 10½ knots will be supplied by Messrs. Ross & Duncan, Govan.

Caird & Co., Greenock.

BORDA. December 17th. Built for the P. and O. Company. The new steamer is of the intermediate class, and was named *Borda*. She is a duplicate of the *Borrima*, launched in September, and similar to the other vessels of that type. The chief dimensions are:—Length, 515 ft.; breadth, 62 ft. 6 in.; depth, 42 ft.; and the gross tonnage is about 11,000. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Enamels have been applied throughout all the bunkers, double bottom, etc., and their Patent "Bitumastic" covering to the tank tops. The *Borda*, which is designed for the Company's service to Australia, *via* the Cape, will be well equipped in every way for the conveyance of passengers and cargo.

Charles Connell & Co., Scotstoun.

DRAMATIST. December 12th. Screw steamer, about 5,500 tons gross, built to the order of Messrs. T. & J. Harrison, Liverpool. The vessel has been constructed to Lloyd's highest class, and is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines with all the latest improvements are being supplied by Messrs. Dunsmuir & Jackson, Glasgow. Messrs. Matthew Keenan & Co. have the contract to cover the boilers, steam pipes, etc., with their patent non-conducting composition.

Messrs. William Denny & Brothers, Dumbarton.

CORINGA. December 16th. Screw tug for the British India and Queensland Agency. The vessel, which has been built to the highest class of Lloyd's Register, is supplied with a set of powerful propelling machinery and ample bunker accommodation to enable her to take a long tow under deep-sea conditions. A centrifugal salvage pump has been installed aft for the purpose of assisting the salvage of stranded and damaged vessels. The *Coringa* will be able to deal with vessels of the largest size.

Fleming & Ferguson, Paisley.

HOPPER STEAMER. December 11th. 1,200 ton steam hopper, built to the order of the Clyde Lighthouses Trust. The steamer is one of two similar vessels which the firm have in hand for the same owners.

John Fullerton & Co., Paisley.

ALLERTON. December 11th. Steel screw steamer of 830 tons deadweight capacity, the first of four building to the order of Messrs. Alfred Rowland & Co., Liverpool, for their coastal trade. Triple-expansion machinery of 650 i.h.p. is being supplied by Messrs. Ross & Duncan, Govan.

Greenock and Grangemouth Dockyard Co., Greenock.

SAINT KENTIGERN. Cargo-carrying steamer, built to the order of Messrs. A. Mackay & Co., Glasgow. The principal dimensions are:—Length, 590 ft.; breadth, 52 ft. 3 in.; depth moulded, 28 ft.; and deadweight carrying capacity, 7,400 tons on a draught of 23 ft. Machinery designed to give a speed of 11 knots will be supplied by Messrs. Rankin & Blackmore, Greenock. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the double bottom, engine and boiler-room bilges, bunkers, tanks, and their patent "Bitumastic" covering to the tank tops. During construction the vessel was under the superintendence of Messrs. G. S. Goodwin & Co., Liverpool.

Harland & Wolff, Ltd., Glasgow.

MISSOURI. November 27th. Built to the order of the Atlantic Transport Line. Dimensions:—383 ft. 9 in. length overall; 50 ft. 4 in. extreme beam, gross tonnage about 5,000, and built to the survey of the Board of Trade. The double bottom is constructed on the cellular principle and the water-tight bulkheads extend to the upper deck. There are five steel decks. The *Missouri* is intended to carry a large cargo and is provided with the latest and most approved facilities for working ship and cargo. The derrick tables on each mast are arranged to take six derricks each, for working Nos. 1 and 2 hatches forward, and 4 and 5 hatches aft. There are two derrick posts forward, one to the port side and one on starboard side, with two derricks in all each lifting 5 tons. There are four 7 i.n. by 12 in. double purchase winches arranged between Nos. 1 and 2 hatches, and four between Nos. 4 and 5 hatches; also two double purchase winches, 7 in. by 12 in., arranged one at each derrick post forward. The warping winch is 8 in. by 14 in. double purchase, placed on the shelter deck aft, and the steam windlass is arranged on this deck forward for working cables 2 3/16 in. diameter. The steering gear is of Messrs. Harland & Wolff's type, cylinders 8 in. by 8 in. by 8 in. quadrant 5 ft. 9 in. radius. The steering engine is situated in a steel house aft on upper deck and controlled by a telemotor from the navigating bridge. During construction the vessel has been under the supervision of Captain Tubb, marine superintendent, and Mr. B. P. Fielden, superintendent engineer of the Atlantic Transport Line. The vessel is a sister ship to the *Maryland*, recently delivered by the same builders for the same Company. She will be completed for sea at Belfast and there receive her machinery.

EGBA. December 17th. Steel screw steamer built to the order of Messrs. Elder, Dempster & Co., Ltd. Dimensions :— 419 ft. 3 in. in length overall and 54 ft. extreme beam, with a gross tonnage of about 5,000. The new vessel, which has been constructed under Lloyd's survey for the 100 A1 class and in compliance with the Board of Trade requirements for passenger certificate, has a double bottom constructed on the cellular principle, and steel decks, with seven watertight bulkheads dividing the vessel into eight watertight compartments. The vessel has been specially designed for trading, in the Company's service, to the West Coast of Africa and has every facility for the rapid loading and discharge of cargo ; also comfortable accommodation for a number of first and second-class passengers. There are fourteen steam winches, warping winch, and steam windlass ; two steel telescopic pole masts with derrick tables on each, there being in all eighteen derricks, lifting from twelve up to fifty tons. The steering gear is of Harland & Wolff's well-known type. The vessel has a complete installation of electric light, and wireless telegraphy apparatus. The first-class dining saloon, smoking room and ladies' room are handsomely furnished and upholstered and have large windows, as have also the staterooms, the accommodation being admirably situated to ensure the utmost comfort. The vessel will be fitted with triple-expansion engines constructed by the builders. During construction the vessel has been under the survey of Captain W. P. Thompson, marine superintendent, and Mr. J. B. Wilkie, superintendent engineer.

Wm. Hamilton & Co., Ltd., Glasgow.

ROEPAT. December 17th. Steel screw steamer intended for pilgrim transport and general trade with the East, and the second of three steamers which the Port Glasgow firm have on hand for Messrs. The Stoomvaart Maatschappij "Nederland" of Amsterdam. The principal dimensions are :—Length 470 ft. ; breadth 56 ft. ; depth to shelter deck, 38 ft. 3 in. In order to facilitate the handling of general cargo, the vessel has been fitted with twenty steam winches, each working in conjunction with a steel-tube derrick. Special arrangements have been made for the convenience of the pilgrims. Safety from fire is secured by an installation of a Marot Fire Extinguishing apparatus. Wireless telegraphy is installed and Welin's patent davits suitable for double banked lifeboats, etc. Messrs. D. Rowan & Co. will supply the machinery, which is to consist of triple-expansion engines and six single-ended marine boilers of 200 lbs. working pressure and fitted with Howden's forced draught. All suitable for a sea speed of 13½ knots.

D. & W. Henderson & Co., Ltd., Partick.

NOVIAN. December 12th. Steel screw steamer of about 6,350 tons gross, built to the order of Messrs. Frederick Leyland & Co., Ltd., Liverpool. She is 400 ft. long between perpendiculars by 52 ft. 2 in. broad by 29 ft. 6 in. depth moulded, is classed in Lloyd's 100 A1 and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner and has an exceptionally large number of powerful derricks which, with eight steam winches, provide ample means for the rapid handling of large cargoes. Comfortable accommodation is provided on shelter deck amidships for passengers. The machinery, which has been constructed by the builders, consists of quadruple-expansion engines, having cylinders 23½ in., 34 in., 49 in. and 70 in. dia. by 51 in. stroke, with steam from three boilers at 215 lbs. pressure. The vessel and machinery have been constructed under the supervision of the owners' superintendents, Captain Fry and Mr. Wm. Scott, assisted by Mr. McClements.

Mackay Bros., Alloa.

EUPION. November 27th. Oil-carrying steamer of 5,000 tons, built to the order of American owners. The vessel is 325 ft. by 44 ft. 6 in., with 28 ft. moulded depth, and built on the Isherwood principle. She will be engined by the North-Eastern Marine Engineering Co.

Napier & Miller, Ltd., Old Kilpatrick.

NAPERIAN. December 3rd. Steel screw steamer, built to the order of Messrs. F. Leyland & Co., Ltd., Liverpool. The vessel has been built to the highest class in Lloyd's (special survey) and to Board of Trade requirements for passenger certificate. The principal dimensions are :—Length b.p., 400 ft. ; breadth moulded, 52 ft. 2 in. ; depth, 37 ft. 7 in., with a gross tonnage of about 6,300 tons and carrying capacity of 9,800 tons. She has complete shelter, upper and main decks, water ballast in cellular double bottom, fore and aft peaks, and large deep tank abaft engine-room. Accommodation for a limited number of first-class passengers is provided for amidships. The vessel has a most complete and convenient arrangement of hatches, derricks and eight steam winches for the rapid handling of cargo, electric light, steam steering gear and steam heating. Messrs. Dunsmuir & Jackson, Ltd., Govan, will supply the machinery, which consists of quadruple-expansion engines with cylinders 23½ in., 34 in., 49 in., 70 in. respectively by 51 in. stroke. There are two double-ended boilers of large size and one single-ended boiler. The hull and machinery have been constructed under the direction of Mr. Scott and Captain Fry, superintendents for Messrs. F. Leyland & Co. Messrs. Matthew Keenan & Co. have the contract to cover the boilers, and pipes with their patent compositions.

Russell & Co., Port Glasgow.

COLORADO. December 18th. A steamer of 6,180 tons gross, built for Messrs. Thomas Wilson, Sons & Co., Hull. The vessel comes under the Admiralty scheme for arming units of the mercantile marine, and her armament will consist of a number of quick-firing guns, for which Messrs. Russell are providing the necessary stiffenings, casings and mountings. Built to the highest class at Lloyds, the steamer is 423 ft. 6 in. in length, 56 ft. in breadth, and 31 ft. 3¾ in. in depth to upper deck. The *Colorado*, which is intended for her owners' general carrying trade, has installations of refrigerating machinery and electric light, and is fitted with all the necessary auxiliaries for the rapid handling of cargo. The vessel has been berthed in the builders' basin, where she will have put on board her machinery, which will be supplied by Messrs. J. G. Kincaid & Co., Greenock.

Scott & Yule, Fraserburgh.

LILIUM. December 11th. Steam drifter for Messrs. A. Buchan and Andrew Williamson, Peterhead. The vessel is 95 ft. between perpendiculars and 18½ ft. in beam. She will be fitted with triple-expansion engines by an Aberdeen firm.

Scott's Shipbuilding & Engineering Co., Greenock.

TATARRAX. November 27th. Oil-carrying steamer of over 6,000 tons, built to the order of the Tank Storage and Carriage Co., London. Principal dimensions are :—Length between perpendiculars, 420 ft. ; breadth moulded, 55 ft. ; and depth to upper deck, 32 ft. 10 in. Built on the Isherwood system of longitudinal framing, and is designed to carry over 8,000 tons of oil or 9,500 tons of oil and general cargo. She is fitted with apparatus for handling ordinary cargo as well as oil. The builders will fit quadruple-expansion engines having cylinders of 24 in., 35 in., 50 in. and 73 in. diameter respectively and a stroke of 51 in. Steam will be supplied by three single-ended boilers working at a pressure of 220 lbs. The furnaces are arranged for Howden's forced draught and to burn either coal or oil fuel. The cargo oil-pumping installation is specially suited for the pumping of petroleum. Two large pumps are fitted for this purpose. Each is capable of discharging 300 tons of petroleum per hour, working at 100 lb. steam pressure. The machinery has been constructed under Lloyd's survey to the requirements of Mr. J. Morton, superintendent engineer for the Company, and under the personal supervision of Mr. J. W. T. Stephens, resident engineer.

ORUBIAN. December 17th. Steamer of 4000 tons, built for Messrs. Frederick Leyland & Co., Liverpool. The dimensions are :—Length, 365 ft. ; breadth, 47 ft. 6 in. ; and depth, 29 ft. 6 in. The builders will supply triple-expansion engines, having cylinders 25½ in., 42½ in., and 72 in. in diameter respectively, and a stroke of 48 in.

Wm. Simons & Co., Ltd., Renfrew.

CORMORANT. November 28th. A "Simons" drag suction hopper dredger for Rangoon (launched with machinery on board), built to the order of the Rangoon Port Commissioners. The vessel is fitted with a suction and discharge pump capable of raising and discharging 2,000 tons of material per hour. Triple-expansion surface-condensing engines are fitted for driving the propellers or pumping outfit, as may be required. Steam is supplied from two cylindrical multitubular boilers constructed for a working

pressure of 150 lbs. per square inch. The main centrifugal pump is connected to a suction frame fitted in a central well at stern, and powerful water jets are arranged on the nozzle at the bottom of suction frame. The hopper doors are controlled by powerful hydraulic gear, the power being supplied from one duplex set of steam pressure pumps. The hopper arrangements include "Simons" patent suction apparatus, which enables the load in the hopper to be discharged overboard for reclamation purposes, as well as through folding doors in the bottom by the ordinary method. "Simons" patent sand-trapping apparatus is also provided in the hopper. These arrangements have been proved to be very effective in retaining the light material which would otherwise be lost in the overflow from the hopper. The dredger has also been built under special survey of Lloyd's.

LAUNCH—Irish.

Messrs. Workman, Clark & Co., Belfast.

CARNARVONSHIRE. December 18th. Twin-screw steamer built for the Royal Mail Steam Packet Company. The *Carnarvonshire* is a sister ship to the *Cardiganshire*, which left Belfast after completion a few days ago. She is 516 ft. in length and has a gross tonnage of 9,500. Accommodation will be provided for a few first-class passengers and for 1,300 steerage passengers. There are seven cargo holds, one of which will be insulated for carriage of refrigerated cargo.

TRIAL TRIPS.

English, Scotch and Irish.

Blyth Shipbuilding & Dry Dock Co., Blyth.

RYTON. December 13th. Steel screw steamer. Throughout the several trial runs the performance of ship and machinery gave entire satisfaction to all concerned. For Launch, see December issue.

Wm. Doxford & Sons, Ltd., Sunderland.

TUSCAN PRINCE. December 8th. A successful sea trial was run and a speed of 13 knots attained. For Launch, see November issue.

J. T. Eltringham & Co., South Shields.

FLYING BREEZE. December 2nd. The trial proved highly satisfactory, and a speed of over 11 knots was attained on the measured mile. For Launch, see November issue.

Wm. Gray & Co., Ltd., West Hartlepool.

NIGARISTAN. December 4th. The performance of the ship and machinery was entirely satisfactory. For Launch, see November issue.

OCEANOS. December 4th. The performance of the vessel and the working of the machinery on trial trip were highly satisfactory. For Launch, see November issue.

Irvine's Shipbuilding & Dry Docks Co.,Ltd., Hartlepool.

ROYAL TRANSPORT. December 20th. The engines and all auxiliaries worked admirably, a speed of 12 knots being attained. For Launch, see December issue.

Northumberland Shipbuilding Co., Ltd., Howdon.

NEW ZEALAND TRANSPORT. November 29th. Steel screw steamer. The trial trip proved in every way satisfactory and a speed of 12 knots was obtained. For Launch, see December issue.

PACIFIC TRANSPORT. November 21st. Steel screw steamer. The official trial trip proved highly satisfactory and a speed of 11¾ knots was obtained. For Launch, see October issue.

Readhead & Sons, Ltd., South Shields.

BRONWEN. December 6th. Screw steamer. The official loaded trial trip gave satisfaction to all concerned, and afterwards the vessel proceeded on her voyage to Port Said, under the command of Captain Williams. For Launch, see November issue.

Ropner & Sons, Ltd., Stockton-on-Tees.

FALLS CITY. November 22nd. Steel screw steamer. The official trial trip was run in Tees Bay and a speed of over 12 knots was attained, the vessel afterwards proceeding to Swansea. For Launch, see December issue.

Short Bros., Ltd., Sunderland.

ANGLO-BRAZILIAN. December 13th. The trial was in every way successful, a mean speed of 11½ knots being easily maintained with 10,600 tons of cargo and bunkers on board. For Launch, see November issue.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend.

ELSINORE. Steamship for carrying petroleum oil in bulk, has just completed her trials at sea and has been handed over to the Bear Creek Oil and Shipping Co., of Liverpool, of which Messrs. C. T. Bowring & Co. are the managers. She is a sister ship to the *Cordelia* and *Rosalind*, which were recently delivered. During the trial trip, which was made in very unfavourable weather, everything worked to the entire satisfaction of all concerned, and the mean speed of the *Elsinore* exceeded contract requirements. For Launch, see December issue.

Wm. Beardmore & Co., Dalmuir.

ALSATIAN. December 15th. This vessel, built to the order of the Allan Line, began an extensive series of official trials on this date. On the trials, which consisted of a series of runs on the measured mile in a strong gale of wind, a speed of 20·48 knots was attained, this being about a knot and a half over that stipulated in the contract. Steering, turning and manœuvring trials were also carried out, the vessel passing through all the tests most successfully. For Launch, see May issue.

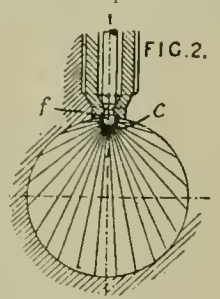
Greenock & Grangemouth Dockyard Co., Greenock.

SAINT CECILIA. At the trials on the Clyde the vessel exceeded her contract speed on the measured mile and attained a speed of 11¼ knots against a strong wind on the run between the Lights. Afterwards she was dry-docked at Greenock. For Launch, see October issue.

Abridgments of New Patents.

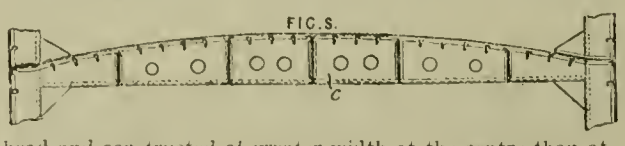
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

18,092. Liquid-fuel Injection Devices. To spread the fuel evenly over the combustion space, the jet plate *c* is formed so as to have an hemispherical reservoir *f* just behind



the opening, which is made as a slit. In a modification the slit is placed so as to distribute the fuel evenly in cases where the axis of the nozzle is not in a radial direction.

18,239. Bulkheads. For the purpose of enabling bulkheads to withstand the pressure of water on one side due to a leaking compartment, horizontal girders *c* are fitted at intervals, being connected to the ship's skin and to the bulk



head and constructed of greater width at the centre than at the ends. Either the outer or inner edge of the girder may be curved and vertical stiffeners may be fitted in conjunction with the horizontal girders.

The Marine Engineer

And Naval Architect.

LONDON, FEBRUARY, 1914.

UNSINKABLE PASSENGER SHIPS.

WE should say that since the *Titanic* disaster in 1912, no problem has received the attention of a large number of naval architects all over the world, so much as that of the possibility of building a large passenger liner that would not, under any of the known mishaps at sea, lose her buoyancy or stability and sink. One of the direct results of that unfortunate occurrence has been the framing of new and ever-increasing legislation relative to life-saving appliances, with a consequential heavy responsibility on the naval architect in the matter of carrying heavy top-weights and occupying a large deck area with boats and rafts. As a solution of the problem Mr. George W. Dickie has propounded a scheme, which he embodied in a paper read before the Society of Naval Architects and Marine Engineers in New York, and whether one is in agreement with all the points in the scheme or not the matter is of such interest as to be deserving of the attention of all those who are giving the same problem their consideration. Broadly speaking, it may be said to consist in the fitting of a double upper-deck and so arranging the water-tight subdivision below the lower deck, that the ship would prove both seaworthy and unsinkable under the most aggravated conditions of flooding. This will, of course, mean wasted space in the ordinary sense, but some compensating advantages can be obtained. For example, the space between the two members of the upper-deck would be utilized for cold storage rooms, air ducts, water and steam piping, stores and other purposes, the fire mains would be thus under direct control, all piping and ducts through living spacing could be avoided and lastly, communication to and from engine rooms, stokeholds, dynamo and refrigerating chambers could be through a continuous water-tight passage fitted with automatic doors operated on the influx of the sea.

The author points out that the ship itself, even with half the freeboard gone, would be so much safer and more comfortable than small boats or rafts that it is worth much thought, careful planning, some compromises and considerable money to accomplish the design of such a hull as would not be open to any serious financial or commercial objections.

The conditions in dealing with the subject are so varying in different types of vessels that the only way to handle the subject is to assume a certain type and work out the problem in its relation to the assumption, and the author has taken a typical large passenger steamer of the following dimensions: Length between perpendiculars, 800 feet ; beam, moulded, 90 feet ; draught, loaded, 33 feet, having a load displacement of 42,130 tons. A reference to the diagram on page 285 will perhaps enable the matter to be more clearly understood. Such a vessel would have a complete double bottom, the inner shell being 4 feet from the outer skin, extending from the fore peak to the after peak and up the sides to the lower deck, which would be 15 feet above the base line. The main deck would be 9 feet above the lower deck and the upper deck 9 feet above the main deck amidships and would extend parallel to the base line for a certain range. From one end of this range to the stem, this deck would slope down, touching the stem at a certain height, and from the other end of the range it would slope downwards aft, touching the stern frame at a similar height. There would be twelve bulkheads extending from the inner bottom to the upper deck. These would be absolutely watertight, without doors or openings whatever, and would be conveniently spaced ; the double bottom space being divided in the same manner. As the horse-power of such a vessel would not be less than 45,000, the boiler compartments and coal bunkers would, to a large extent, control the subdivision, and four main boiler compartments could be provided, each taking four double-ended Scotch boilers abreast, 17 feet in diameter. Each boiler compartment would have a bulkhead at each end a good distance from the main bulkhead; extending to the inner bottom and skin of the ship and built strong enough to support the wall of coal between them and the main bulkhead. The coaling capacity of the bunkers would be 6,000 tons, all of which run out directly in front of the boiler it is to serve. The amount of coal provided is sufficient for eight days' steaming at 45,000 horse-power.

This provision would enable the ship to be considered safe from any injury to the bottom below the lower deck and that danger of sinking would arise from rupture of the skin above the lower deck and under the water line which is at the upper deck line. Such danger would arise from collision with another ship at such an angle as would cause penetration or through striking some stationary mass between the lower and upper decks, opening up several compartments to the sea, as in the case of the *Titanic*.

Considering penetration by collision first, the damage would be vertical and might, if the striking vessel were large and nearly at right angles, penetrate quite a distance into the side of the vessel, probably not entailing more than three adjacent compartments if near amidships, or say about 200 feet. Dealing with the condition with three adjacent compartments near the centre of this vessel flooded, it may be said that from the capacity of one of these compartments would have to be deducted the displacement of the boilers, less furnaces, tubes and combustion chambers, as well as the coal capacity, after allowing for these and for a central watertight passage under the upper deck a residuum volume is left which must be carried by new displacement. In order to provide this displacement a double upper deck is fitted, the upper member of which would be a certain distance above the lower amidships and parallel to the base line between certain of the frames, from which a rise of 2 feet would take place and follow the shear line to the stem and stern. In case of a collision cutting into the upper member of the upper deck the local damage would be confined practically to the depth of penetration and the width of the striking ship, as the

space between these decks would be divided into very small compartments, both transversely and longitudinally. If the injury was near the forward end of the ship, the lower member of the upper deck extending downwards reduces the size of the flooded compartments and the displacement of the contents of the holds, and at least 50 per cent. would still further have to be deducted, while the upper member rising at the point indicated and following the shear line would provide sufficient displacement to trim the ship till water could be introduced into the double bottom aft. These same conditions would apply in case of serious injury aft. It follows that all openings through the upper deck, such as boiler and engine casings and hold hatches, would be watertight structures for at least 16 feet above the load water line.

If, secondly, the ripping open of the side of a ship for a considerable proportion of her length took place owing to striking the projecting edge of some obstruction under the water line, which might happen between the lower and upper deck for a great proportion of the vessel's length, and assuming the vessel sinks 11·86 feet, or 6·36 feet above the upper member of the upper deck amidships, under these conditions the ship would then draw 43·86 feet. This assumption may be taken to be the very limit of the possibilities, yet, for an unsinkable ship, it should be provided against in the design. Between the upper member of the upper deck and the shelter deck there should be no air pores or side lights, or if lights are fitted they should not be arranged to open and the glass should be cast around a wire mesh as protection against cracking. The objection that would naturally present itself to this type of vessel is the apparent waste of space between the upper decks. This space, however, need not be wasted, but, be utilised as previously indicated.

Referring to the cross section in the diagram, through one of the boiler compartments is provided a longitudinal passage under the upper deck which would be extended through each compartment, from which it would be entered through an air lock. In each boiler compartment, on each side could be the living quarters for all the men engaged in that compartment. These quarters would be artificially lighted and ventilated. The air would be taken from ducts between the upper decks on the inboard side, discharge at the floor line and would pass up through ventilating pipes on the outboard side. It might be objected that these quarters would be hot in spite of good ventilation, but it is considered to be quite unnecessary to have much heat in the boiler rooms. The boilers in such a ship would be worked under forced combustion and in that case the fans for forced draught could draw the air from the outer casing round the smoke stack and uptakes and discharge it into a casing outside the the boiler lagging so arranged that the air would circulate round the boilers on its way to the tubular heaters in the uptakes. Thus any heat radiating through the lagging on the boilers would be taken up by the air for combustion, leaving the stoke-holds comfortably cool, and with cold air freely circulated through the living quarters they should be quite comfortable.

The air lock doors into the central passage would be self-closing, balanced doors, easy enough for a man to open, but certain to close after him, and it would hardly be possible to conceive of any damage to this passage, even from a collision with a very large ship. At both ends of this passage way would be stairs in a water tight well leading to the shelter deck. The compartment forward of the forward boiler compartment would contain the main ventilating fans with cooling and heating chambers for the air. These ventilating fans would be supplied from trunks extending well above the weather deck and their capacity would be such as to ensure thorough ventilation throughout the ship. The compartment aft of the main engine room would be the electric generating room, where a sufficient generating plant would be installed to ensure perfect lighting, heating and ventilation. It follows that further details cannot be discussed at length, but the brief outline of the suggestion will enable some judgment to be passed on the proposal.

MESSRS. CROSBY, LOCKWOOD & SON, of Stationers Hall Court, E.C., and 5, Broadway, Westminster, have recently issued a complete and well-illustrated catalogue of their scientific and technical publications. They will be pleased to send a copy to anyone who may be interested.

The Shipping, Engineering and Machinery Exhibition, to be held at Olympia, Sept. 25th to Oct. 17th, promises to be most interesting and representative of its designation. Already a large proportion of the available area has been booked and the exhibits arranged for. The largest space secured by any one of the exhibitors is that applied for by the Netherlands Government. This space is being arranged in sections, which will be representative of the various manufactures and industries coming within the scope of the exhibition. It is intended, during each evening that the exhibition is open, to have papers read, under the auspices of the Engineering Societies; illustrated lectures and descriptive views showing various processes of manufacture. There will be a loan collection section, showing various types of vessels of historical interest.

THE INTERESTS OF THE MARINE ENGINEER.—While the inter-communication of technical affairs among the members of an engineering society is the main business of such institutions, the reading and discussing of papers should by no means sum up the whole work. The raising of the status of its members is an important consideration, and as a means to this end it is as well that the social side should not be neglected, where an interchange of the courtesies of life, apart from business affairs, may maintain a healthy moral tone and open the way to a widened vista and loftier view. There are several other interests apart from technicalities which may well affect the *personnel* of the engineer, such as some curious anomalies in the application of the Insurance Act, in the proposed Board of Trade regulations, in the manning requirements in the engine department, in the engineer and artificer departments of the Royal Navy, and of the Royal Naval Reserve. These matters, which may not be considered to come within the immediate scope of a technical society, have a more or less immediate bearing upon its affairs, and opportunity for wider discussion among the members is desirable. The question of the Royal Naval Reserve has been ventilated from time to time, but so far no definite steps appear to have been taken towards formulating a scheme which would be acceptable to that section of the community most intimately concerned. In connection with the discussions of the Board of Trade regulations and suggested revision, the desirability of a third-class certificate has again been brought under notice; the increasing responsibilities of the marine engineer, the increase in size of vessels in numbers and in staff complement, have considerably altered the bearing of this matter, although the possibility of the third certificate being misused or abused is still the same.

SAFETY OF LIFE AT SEA.

INTERNATIONAL CONFERENCE.

SUMMARY OF PROVISIONS.

THE International Conference on safety of life at Sea, which was convened by His Majesty's Government last autumn (the report of the first meeting being given in our December issue), completed its labours on January 20th, when a convention, dealing mainly with the principal questions relating to Safety of Life on Ocean-going Passenger Steamers, was signed by the Plenipotentiaries of the following States:—The British Empire (including Canada, Australia and New Zealand, which were separately represented,) Germany, France, the United States of America, Austria-Hungary, Italy, Spain, Sweden, Norway, Holland, Belgium and Denmark. The Conference held its first meeting at the Foreign Office, on the 12th November last, under the Presidency of Lord Mersey. The Conference at once divided into five Sub-Committees, dealing with different branches of the subject. These five committees completed their labours and presented their reports shortly before Christmas, when a Drafting Committee proceeded to incorporate the recommendations of the various Committees into a Draft Convention, for consideration by the full Conference. The period which has elapsed since Christmas has been occupied by this task, which was only completed about the middle of January, when the resulting Convention was unanimously adopted by the full Conference. The Conference has agreed that the actual text of the Convention, which contains no fewer than seventy-four articles, and covers about sixty printed pages, shall not be officially published until February 15th, in order to give the Delegations of the various contracting States time to communicate it to their respective Governments. An outline of the principal results achieved was, however, indicated in a speech in which Lord Mersey moved the adoption of the Convention at the meeting of the Conference on Jan. 19th.

The principal provisions of the Convention, summarized, are as follows:—

SAFETY OF NAVIGATION.

(Chairman of Sub-Committee, Sir NORMAN HILL.)

An International Service is to be established, at the cost of the nations principally interested, for the purposes of ice patrol, ice observation and the destruction of derelicts in the North Atlantic; and it is proposed that this service be placed under the control of the Government of the United States. This service will take over and continue the work done by the two vessels employed by the United States during the ice seasons of 1912 and 1913 in locating the ice, in determining its limits to the south, east and west, and in keeping in touch with it as it moves southward, in order that vessels on the routes may be kept fully informed by means of wireless messages of the position of the ice. The service will also continue the ice observation work started last year by the British Government, with the object of ascertaining the set, the velocity and the variations of the currents and the manner in which the duration and rate of the ice drift is thereby controlled, with a view of determining before the opening of each ice season, and therefore before the ice has become a peril, the fundamental conditions which govern the movement of the ice.

The service will be further entrusted with the duty of dealing with dangerous derelicts on the west side of the North Atlantic to the east of a line drawn from Cape Sable to latitude 34° North and longitude 70° West. The waters to the westward of this line will continue to be watched by the United States. To make the International Service more effective, the duty is imposed on the masters of all vessels of reporting, by the best means at their disposal, all dangerous ice and dangerous derelicts met with on their voyages. To make these recommendations effective a code has been prepared to facilitate the reporting from ship to ship, and to the land stations, and the distribution of the information obtained over the vessels at sea. The rule of prudent seamanship laid down in the judgment of the Court of Inquiry in the *Titanic* case, has been affirmed internationally, namely, that when ice is reported on or near the track, the ship must proceed during the night at a moderate speed or alter its course so as to go well clear of the danger zone.

The practice under which the routes across the North Atlantic are fixed by international agreement between the passenger lines is left unaltered and the Governments undertake to impress on all shipowners the desirability of following, as far as possible, those routes. The effective lighting of boat decks is provided for, and the carrying of Morse signal lamps is made compulsory. An international code for urgent and important signals has been adopted. It has not been possible to revise the International Collision Regulations, as many of the States, parties to those regulations, were not represented at the Conference; but the convention binds the contracting States to bring about the revision of the regulations on five points, and re-examination upon other important points is recommended.

It has not been possible to embody in definite articles in the convention a number of points affecting safety of navigation, which were considered by the Committee. But on these points the Committee has submitted resolutions embodying their views.

SAFETY OF CONSTRUCTION.

(Chairman of Sub-Committee, ADMIRAL CAPPS.)

In any consideration of the means for securing greater safety of life at sea, the type of the vessel itself and the character of its construction are of the highest importance. The questions which arise even in a general consideration of the subject of "Safety of construction" are technical and complicated. Moreover, when such solutions as may be practical have been attained, their expression in language suitable for embodiment in a Convention is difficult. The Committee charged with the consideration of this subject has, however, submitted a Report which states definite conclusions, and has embodied them in language suitable for incorporation in a Convention.

For the purpose of this chapter of the Convention, vessels have been divided into two classes, *viz.*, (1) New vessels, (2) Existing vessels. The designation "new vessel" is applied to all vessels, the keel of which is laid after the date on which the Convention goes into effect. The designation "existing vessel" is applicable to all others. These designations are, in all cases, subject to such limitations as to size of vessel and character of voyage as are imposed by the specific requirements of the Convention. The provisions of this chapter are applicable in their entirety to all "new vessels"; for "existing" vessels, the Convention provides that "existing arrangements . . . shall be considered on their merits by the Administration of the country to which each vessel belongs, with a view to improvements, providing increased safety where practicable and reasonable."

The most difficult and also the most important question considered under "Construction" was that of the subdivision of ships into an adequate number of main watertight compartments, so that in the event of damage which might destroy the integrity of one or more of these compartments the ship would, so far as might be practicable, have sufficient reserve buoyancy to remain afloat. The practicable degree of this sub-division is necessarily dependent upon the size of the vessel and the service in which employed, and the Convention provides that the degree of safety should increase in a regular and continuous manner with the length of the vessel, and that "vessels shall be as efficiently subdivided as is possible having regard to the nature of the services for which they are intended." It is also explicitly stated that the requirements imposed by the Convention are minimum requirements. In addition, provision is made for suitable record on the Certificate of Safety of any vessel whose degree of sub-division exceeds the highest requirements imposed by the Convention for vessels primarily engaged in the transportation of passengers, and the con-

ditions under which this official record may be made are expressly provided for in the reglement.

It is quite impracticable in this summary to do more than make the foregoing brief reference to this highly technical subject, but the requirements as to sub-division are laid down in *extenso* in the Convention, and the reglement annexed thereto.

Among the other important subjects under the heading "Construction" which have been covered by the Articles of this chapter may be mentioned the following:—(1) Bulkheads for preventing the spread of fire; (2) Suitable means of escape from all water-tight compartments; (3) General requirements as to strength of water-tight bulkheads and decks; (4) Reduction to the smallest number practicable of openings in water-tight bulkheads; also restrictions upon the location, character and means of closing such openings. (5) Restrictions as to the character, number and location of openings in the ship's outer skin and appliances for closing such openings; (6) Specific requirements as to the fitting and extent of double bottoms; (7) Periodical operation and inspection of water-tight doors, scuttles, valves and other appliances for closing openings in bulkheads and the hull structure below the bulkhead deck; also compulsory entries in the official log in relation to such drills and inspections. (8) Requirements for adequate backing power, also auxiliary steering apparatus; (9) Provisions for the survey and inspection of both "new" and "existing" vessels in all matters relating to the hull, boilers, main and auxiliary machinery and equipment.

In its Report the Committee on Safety of Construction recognised the importance of making further study in certain important subjects whose consideration could not be undertaken or completed at this time; also the desirability of exchanging freely all information in regard to "Safety of construction." The enforcement of the foregoing recommendations as to future research and exchange of information have been fully provided for in the Convention. In concluding this summary of the provisions on safety of construction it is important to point out that, even after the most careful attention to all practicable details of design which increase the safety of a vessel at sea, there still remains the possibility of a serious and even totally destructive accident. Therefore it is imperative that those charged with the management of vessels should never relax their vigilance on the supposition that any vessel is unsinkable. On the contrary, they should strive to add to the safety provided by the vessel itself that very great increase in safety which results from prudent and skilful management and navigation.

Wireless Telegraphy.

(Chairman of Sub-Committee, Mr. E. G. Moggridge.)

This Convention provides that all merchant vessels of the contracting States when engaged upon international (including Colonial) voyages, whether steamers or sailing vessels, and whether they carry passengers or not, must be equipped with wireless telegraphy apparatus, if they have on board fifty persons or more (except where the number is exceptionally and temporarily increased to fifty or more owing to causes beyond the masters' control). The contracting States have, however, discretion to make suitable exemptions from the requirement to carry wireless apparatus in certain cases, of which the most important is that of vessels which in the course of their voyage do not go more than 150 sea miles from the nearest land. The classification of the vessels, required by the Convention to be provided with wireless apparatus, follows the categories contemplated by the Radiotelegraphic Convention. The precise classification is too complex to be summarized but, broadly speaking, the fast passenger steamers are placed in the first category, other steamships intended to carry twenty-five passengers or more in the second category, and all other vessels required to be fitted with wireless apparatus in the third category. It need hardly be said that the owner of any vessel placed in the second or third categories can claim that his ship shall be placed in a higher category, if it complies with all the requirements.

A continuous watch for wireless telegraphy purposes is to be kept by all vessels required to be fitted with wireless apparatus as soon as the Government of the State to which the vessels belong is satisfied that such watch will be useful for the purpose of saving life at sea; and meanwhile, (subject to a transitional period for fitting wireless installations and obtaining the necessary staff) the following vessels will be required to maintain a continuous watch, in addition, of course, to all vessels placed in the first category:—(1) Vessels, of more than 13 knots, which carry 200 or more passengers and which make voyages of more than 500 miles between two consecutive ports; (2) vessels in the second category during the time they are more than 500 miles from land; (3) other vessels, required to be fitted with wireless apparatus, which are engaged in the trans-Atlantic trade, or whose voyage takes them more than 1,000 miles from land. Vessels placed in the second category, but not required to keep continuous watch, are nevertheless required to keep such watch for at least seven hours a day, besides the watch of ten minutes in each other hour required by the Radiotelegraphic Convention. Vessels concerned with the fishing and whaling trade are not required to keep a continuous watch. The continuous watch may be kept by certificated operators or by watchers qualified to receive and understand signals of distress, and provision is made for the possibility of the future invention of an automatic apparatus which will take the place of watchers. The wireless installations must have a range of at least 100 miles and an emergency apparatus, placed in conditions of the greatest safety possible, must be provided unless the main installation is placed in the highest part of the ship and in the conditions of the greatest safety possible.

The Convention provides that the master of a ship in distress shall have the right to call to his assistance from amongst the vessels which have answered his appeal for help, the vessels which he thinks can best render assistance and the other vessels which have received the call may then proceed on their way. A transitional period is provided to enable wireless apparatus to be fitted and operators and watchers obtained.

Life-Saving Appliances.

(Chairman of Sub-Committee, Sir John Biles).

The Convention lays it down that there must be accommodation in lifeboats or their equivalents, for all persons on board. Lifeboats are divided into two classes, (1) the ordinary open boat, or other boats with fixed sides, and (2) boats having the upper part of the sides collapsible. The second class is rendered necessary by the consideration of stowage. Every vessel must be fitted with a minimum number of davits or equivalent appliances which varies in accordance with the length of the ship. Each of these davits must have a lifeboat of Class I. attached to it and thereafter additional lifeboats must be provided, until provision has been made either for a minimum capacity based upon the assumption that a maximum number of boats will be placed under each set of davits, or alternatively for accommodating 75 per cent. of the total number of persons on board, whichever is the greater. If any further accommodation is required, it may be provided either in lifeboats or in approved "pontoon life-rafts." The pontoon life-rafts referred to in the Convention are the improved appliances devised by the British Boats and Davits Committee which reported in May of last year. The Convention lays down detailed regulations regarding the construction and measurement of different types of boats, and of the pontoon raft, their equipment, the stowage of boats and rafts, strength of davits, number and construction of lifebuoys and lifejackets. It is provided that as large a number as possible of the boats and rafts must be capable of being launched on either side of the ship so that as few as possible need be launched on the weather side. A surplus of lifejackets in the form of special lifejackets for children is required. While precise regulations are laid down for the types of life-saving apparatus described provision has been made for the adoption of other types equally efficient which may receive the sanction of individual administrations who will inform the others of their action.

The Convention further lays it down that there must be a minimum number of members of the crew competent to handle the boats and rafts. For a boat or raft of ordinary size carrying not more than sixty persons the minimum number is fixed at three, with additional numbers for larger boats in accordance with a scale laid down in the Reglement. These men will hold a certificate of competency issued under Government authority. The Convention also provides that all ships to which it applies must be efficiently and sufficiently manned from the point of view of safety of life at sea.

The carriage of dangerous goods is forbidden and each administration will issue from time to time official warnings as to what goods are dangerous either singly or in combination, and will impose regulations as to their stowage and packing when necessary. For detecting fire an organized system of patrols is required, and the regulations require adequate provision for extinguishing fire, and for the organization of the crew for emergencies and for boat and first drill. All ships are to have an adequate system of lighting so that in an emergency the passengers may easily find their way to the exits from the interior of the ship. In new ships an independent source of lighting must be fitted as high as possible. The boat decks must be well lighted.

MUTUAL ACCEPTANCE OF CERTIFICATES TESTIFYING TO COMPLIANCE WITH THE REQUIREMENTS OF THE CONVENTION.

(Chairman of Sub-Committee, His Excellency Dr. VON KOERNER).

A summary of the work of this Committee on Certificates has not been prepared, but its recommendations are exceedingly simple. They are, in effect, that the ships of the contracting States which comply with the requirements of the Convention shall have furnished to them certificates of the fact which shall be accepted by all the States as having the same value as the certificates issued by them to their own ships and as constituting *prima facie* evidence of compliance with the Convention. A form of certificate is annexed to the report to be issued in February, which in addition to recording compliance with the requirements of the Convention will also enable shipowners who have in certain respects done more than comply with those requirements to have the fact recorded.

GENERAL PROVISION.

Lord Mersey made a few remarks on the work of the Informal Committee of which he was chairman. That Committee was concerned with what are termed "Dispositions Générales." These dispositions defined the ships to which the Convention should apply, the leading feature being that except as otherwise provided only ocean-going steamers carrying more than twelve passengers should fall within its provisions. There are, however, several exceptions to the above limitation, the most important being in the case of wireless telegraphy. Provision was also made for an interchange between the Governments of laws and rules relating to safety of life at sea and for the imposition by each of the Governments where necessary of penalties in case of neglect to comply with the provisions of the Convention. Further matters dealt with were the admission of other States which later on may wish to come under the Convention, the adherence on behalf of colonies of contracting States, the date (31st December, 1914) by or before which the Convention must be ratified by the different States, and the date (1st July, 1915), at which the Convention is to come into force.

At the meeting held January 20th at the Foreign Office, for the purpose of signing the Convention, the President of the Board of Trade (Mr. Sydney Buxton) congratulated the members of the conference on the issue of their work, and said further that this conference was to be followed by a further International Conference, to deal primarily with the question of Load Line; but which he hoped would also consider other kindred questions, such as timber deck loads, and thus another great stride would be taken in the direction of safety of life at sea.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

Disasters.

GRADUALLY, as time wears on, the possibilities and limitations of wireless telegraphy, as a protection to life and property at sea, are being realized and, to some extent at all events, advantage is being taken of the lessons which experience has in some cases so dearly bought. The *Titanic* disaster showed that a vessel which carries but one operator is as much cut off from the rest of the world during the necessary periods of that man's relief, as she would be if she had not been fitted with an installation at all. One consequence of this lesson was that the International Radiotelegraphic Convention of 1913 drew up a series of standards, by which all vessels fitted with wireless apparatus were divided into some three classes. Of these the first class includes such vessels as carry such a complement of operators as will enable a continuous service to be carried on night and day. The next class contains such vessels as have so limited a staff that a continuous service cannot be provided, but arrangements are made whereby, when the operator is off duty, there shall be some one about who shall be able to notice the coming through of an S.O.S. signal. The last class comprises those vessels whose operators have no regular working hours. In the first class are, of course, included the great mail and passenger steamships of the important North Atlantic companies, and it is now announced that all the mail and passenger steamships of the Union-Castle Company are also to be brought up to this standard. It is pleasant, but hardly unexpected, to notice that, though the management of the great South African Company has been changed, the old tradition that no precaution for safety should ever be neglected is still maintained by those who have the direction of its affairs, and that in spite of the fact that, in this instance, the cost of safety is heavy, for it means the provision of a second operator for at least twenty vessels of the fleet.

An interesting result of the classification now made by the Convention, will apparently be that standard time will necessarily be adopted at sea, at all events in the wireless rooms of the steamships with installations. For otherwise advantage could not be taken of the provision of the second class ships, whereby, during the first ten minutes of every hour, there shall be a watcher on duty to receive emergency signals.

The first disaster of the month in which wireless played a conspicuous part was the loss of the steam-tanker *Oklahoma*, belonging to the Gulf Refining Company. She was at the time of her loss erroneously referred to as the largest tanker afloat. Her gross tonnage being but 5,853 tons, this statement was of course quite ill founded, for apart from the numerous 15,000 ton (deadweight capacity) vessels of the Eagle Oil Transport Co., such a ship as the *Narragansett*—of *Volturno* fame—exceeds the *Oklahoma* in size. Possibly she was the biggest vessel of her type under the American flag. But anyhow she was on her voyage from New York to Port Arthur, Texas, to load oil, when, at 8 a.m. on the morning of the 4th January, a heavy sea running at the time, a rending sound was heard, and almost immediately the ship broke in two abaft the bridge. Time seems to have been afforded to those on board to send off an S.O.S. signal, and, the vessel then being within fifty or sixty miles of Sandy Hook, there was no lack of steamships to hasten to the rescue. The liner *Bavaria* of the Hamburg-American Co., being on her voyage from Hamburg to Boston, was in fact the one which effected the boat service and took off Capt. Gunter and the other seven survivors from the fore end of the vessel just twenty-four hours after the accident occurred. The work of rescue was arduous and dangerous, and indeed might have been impossible but for the presence of the other ships which, forming in line, constituted themselves into a breakwater which gave some shelter to the liner and her boat during the operations. Six other survivors from those who had been at the after end of the wreck were picked up after six hours' exposure in one of their own boats by the Booth liner *Gregory*, which landed them at New York. It is said that a second boat from the *Oklahoma* was found by the United States revenue cutter *Seneca*, but its occupants were already dead. The total crew of the ill-fated vessel numbered thirty-eight, all told, and so the loss of life amounted to some twenty-four souls. Wireless, of course, proved its value again in this case, but some interesting questions will undoubtedly be raised at the enquiry—which presumably will be held in the United States—as to the causes of the disaster. Even in heavy weather it seems an inexplicable thing that a well-built ship, not yet six years old, should break in two. At first it was suggested that the accident was due to an explosion, but it would seem that this theory has been authoritatively negatived. All the real weight was, of course, at the after end of the vessel, where the boilers, machinery and bunkers were situated. That part of the craft was naturally fully laden, whilst the rest of her was only in ballast trim. It will be instructive to learn how the ballasting was effected on this occasion—whether the not uncommon practice in vessels of this type was observed and alternate tanks filled up, or whether some of the tanks contained loose water. But whatever may have been the condition of the ship at the

moment the fact remains that she did break in two, and that fact will no doubt strengthen the feeling amongst builders and owners of tank steamers that the best design for such craft is that adopted in most of the recent additions to the oil fleet—*viz.*, the Isherwood system of longitudinal strengthening.

The other disaster to which attention should be called is that which befell the Royal Mail Steam Packet Co.'s *Cobequid* on the morning of Tuesday, the 13th January, off the coast of Nova Scotia. To some nautical persons the name of the vessel and her service seemed to suggest that there was some mistake in attributing her to the Royal Mail fleet, but the explanation of this unfamiliarity is simple. Messrs. Pickford and Black, of Halifax, Nova Scotia, recently were the managers of a line which traded between Canada and the West Indies under the auspices of the Canadian Government. A new contract being under consideration last year, the Royal Mail Company stepped in and took over the work, undertaking to provide four steamships of about 5,000 tons apiece for the service. Two of the steamers allotted to it were taken from the Royal Mail Co.'s own Shire line and two—twin-screw liners of the famous "G" type—were specially purchased from the Union-Castle Co. All were given new names, being called after Canadian bays. The *Cobequid* thus disguises the well known steamer *Goth*, which was built for the old Union Line in 1893 by Messrs. Harland & Wolff at Belfast. She had inaugurated the new West India line by sailing from Canadian ports in December and was on her return voyage when overtaken by this disaster. She seems to have struck on Trinity Ledges, off the Beaver river, on the morning of Tuesday, the 13th January, in dense fog and terrible seas. Her wireless at once sent out the S.O.S. signal, but she had got out of her reckoning and those in charge thought she was stranded on Briar Island in the Bay of Fundy. The calls for help therefore indicated that place as her position, and thither immediately were despatched from Halifax the Canadian Government steamer *Lady Laurier*, and from St. John, New Brunwsick, the *Lansdowne*. Other vessels also hastened to the rescue, but the wreck could not be found, the calls for aid ceased and the worst fears were naturally entertained for the passengers and crew. The former, it may be mentioned, numbered some twenty four, of whom five were in the saloon, most of these being connected with the development of the new service. Amongst the passengers, however, were nine women and children and the crew numbered between eighty and ninety. The anxiety became intense, but it was fortunately soon relieved by renewed messages from the wrecked vessel. It was now apparent that she was not on Briar Island at all, but within ten miles of the port of Yarmouth, Nova Scotia. Thither the steamer *Westport* at once made her way, and she soon had the satisfaction of taking on board all the passengers and crew, save Captain Howson and eleven of his ship's people who elected to stand by the wreck. These, however, it may be explained, were taken off by the s.s. *Aberdeen* on the morning of the 15th January, and thus the accident, though presumably involving the loss of a fine and noted mail steamer, did not cause the death of a single person.

When the *Westport* got to the scene of the disaster the reason for the interruption of the *Cobequid's* calls was apparent enough. The range of the tide is in these waters notoriously wide, and as the flood made, the engine-room was filled and the operators lost their power. Gradually, with the rest of those on board, they were driven to the upper parts of the ship till at last, when the rescuers came, all were found in the captain's cabin, then the only dry place in the vessel. Steam had gone altogether soon after the stranding, but when the tide fell the operators seem to have been able to make some use of the apparatus with their emergency plant.

A Staff Captain on the "Olympic."

The managers of the White Star Line announce that the *Olympic*, which sailed from Southampton after her overhaul on the 21st January, took with her Lieutenant G. R. Metcalfe, R.N.R., in the new position of staff captain. This officer has long experience of command and has for some time been in charge of a large Atlantic passenger liner, the *Canopic*. He goes, however, to the *Olympic* to "assist her commander in the navigation of the ship, the management of the other officers, and the control of discipline and other matters," but not of course to relieve the supreme commander of the general responsibility of the ship. In taking this new departure the White Star Line is, of course, adopting, with modifications of detail as commend themselves to it, the principle which has already proved its value to the Hamburg-America Company for their *Imperator* and *Vaterland*, and to the Cunard Line for its *Mauretania* and *Lusitania*.

The White Star Company seems to have done well in the passenger side of its business in 1913. Figures are published which show that it carried :—

West bound.		*East bound.*	
16,581	...	15,550	First-class passengers.
45,901	...	24,181	Second-class passengers, and
92,962	...	48,114	Third-class passengers.

The outward traffic is said to have been for each of the three classes the largest carried by any line.

The Cunard Company's Figures,

however, are also said to be the largest of any lines. As these do not distinguish between first and intermediate class passengers they are not readily comparable with those of the White Star Co. They are as stated :—

West bound.	From Liverpool.
40,160	First-class passengers.
69,507	Third-class passengers.
109,667	Total *from Liverpool* only.
197,493	Total from all European ports.
East bound.	
91,782	Total to all European ports.

The "Volturno."

Judgment in this enquiry has at last been delivered. The Court commences by saying that the whole crew did its duty, and, whilst commending Captain Inch for his resource and pluck—refers to the fact that he omitted on the outbreak of the fire to throw overboard the ship's magazine, which exploded at 9.45 p.m. It is pointed out, however, that the master frankly admitted this omission, and stated that it never occurred to him to do so. In view of the many things which he did think of, the Court held that this one omission ought not to detract from their recognition of the bravery and seamanship which he displayed. The suggested cause of the outbreak is the superoxide of barium carried in the ship's cargo. It is thought that the drums may have been injured by the heavy rolling of the ship in the weather she experienced, then the powder would escape and the friction to which it would be subjected would cause a flame. Two previous cases of fire on ships which carried this chemical were referred to in support of the theory. The discipline of the ship seems to have been effective, and the life-saving appliances and drill sufficient, though the Court was of opinion that had the men not had previous experience, they would not have found themselves qualified to deal with such an emergency. No suggestions seem however to be made as to how the conditions in that regard may be improved. The case does not add to the knowledge previously accumulated as to the use of oil in smoothing troubled waters. As regards the use of the boats, it is pointed out that the chief loss of life was due to the attempts made by the crew of the *Volturno* to launch their own boats, Nevertheless the opinion is held that the master under the circumstances did what any other good seaman would have done, when he gave the orders to put the boats in the water. For he did not, and could not, know that his ship was going to remain afloat so long as she did, and he had every reason to fear that she might go down at any moment and take with her every soul on board. The boats really seemed to offer a better chance —slender though it may have been—than the burning, labouring steamship. Credit is given to the engineers and their staff for the zeal they displayed wherever they were required, be it below or on deck, whilst each member of the crew seems to have been efficient for boat service—a fact which should not be lost sight of, in connection with the suggestions of one of the American delegates to the International Conference on the question of safety at sea, now sitting in London. The whole enquiry seems to emphasize the facts which transpired at the time of the disaster, and whilst it adds little to our knowledge, it does not seem to bring out any suggestions which may be of value for the prevention of future accidents. For every one knew, even before the enquiry, that such chemicals as superoxide of barium may under certain conditions become dangerous.

ENGINEERS AND ENGINEERING IN THE ROYAL NAVY.

(*Continued from page* 187.)

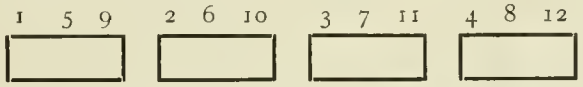
To give some idea of the duties of engineer officers, we will take for example one of the cruiser class of vessels commissioned for the manœuvres of last year. The engine-room staff consisted of one engineer-commander, one senior engineer-lieutenant, and five warrant engineers, in addition to three chief engine-room artificers, twenty-three engine-room artificers, ten chief stokers, twenty-one stoker petty officers, twenty-seven leading stokers and 190 stokers; of this staff not one had ever been to sea in the ship. The engines were in two sets, having cylinders 36", 59" and two 68", with a stroke of 48", indicating at 120 revolutions per minute 21,000 h.p. The boilers were thirty in number, of the Belleville type, and placed in four stokeholds; the auxiliaries were two main and auxiliary air pumps, two main and auxiliary circulators, two steering engines, two drain pumps, five air compressors, two hydraulic engines, four CO_2 machines, two refrigerating engines, four fire and bilge pumps, two capstan engines, two boat hoists, two blowing engines, eight boiler-feed pumps, two hot-well pumps, twelve fan engines, in addition to the machinery of the workshop and steam boats.

We will suppose that the ship is to proceed to sea at a certain time, the order will be given to the engineer-commander to have steam for a certain number of knots (it is usual to give about eight hours' notice if not under banked fires). The engineer-commander will inform the senior engineer of the time it is expected to get under way, and he will fill in the order book with the time, what boilers are to be used, what auxiliaries are to be run, and any other special instruction. This book is taken to all officers concerned and initialled by them, and about six hours before the ship has to proceed the engineer officer who is taking the first watch, will go below and see the following sequence of duties carried out. During the first hour he would inspect the boilers, and see the glasses showing water up to working level, he would also try the test cocks, open the air cocks and then have the bottom fires lighted. He would then see all gauge cocks open and also all drains on main and auxiliary steam pipes and valves, he would have opened all boiler stop valves (sectional valves, bulkhead valves, intermediate screw-down valves), starting and manœuvring valves, also valves to steering engines, main circulating engines, starting engines, to sirens or whistles and drain pumps. The silent blow-off would be closed, and the jacket drains opened to the bilge, also the cylinder and slide valve casing drains. The exhaust valves on the auxiliary condensers, and the sluice valves of main and auxiliary circulating pumps would be opened, the air cocks on the condensers opened until the condenser is full of water. When fresh water accumulated in the condenser it would be tested for freshness to ascertain whether all the condenser tubes are tight. All crank pits and working parts of the main engines would be examined for obstructions, and the turning gear disconnected, the main feed tanks examined and the suction valves on the main and auxiliary feed pumps opened, the indicator and revolution counter connected and adjusted, the stern gland slackened back and funnel guys adjusted. All these duties would take the watch the greater part of an hour. In the second hour the wing fires would be lighted, and directly steam was showing in the boiler, the safety valve and water gauge cocks would be tested, the regulating and manœuvring valve would be closed and the cylinders warmed by means of the jackets. As soon as possible the drain pump would be started and also the main circulators.

During the next hour the bottom fires would be spread, after which the furnace doors would be closed and the ash-pit doors opened, the cylinder drains connected and the condenser and air pumps started. At the end of the fourth hour the officer of the watch and all hands would be relieved, everybody in the watch waiting for his own relief, and not leaving until his own relief turns up. During the next watch steam would be raised to the pressure required, the sirens, whistle, voice tubes, engine-room telegraph and steering gear would be tried, and during the last hour of the watch the links would be run over and the main engines tried, permission being first obtained from the bridge.

Having got fairly under way, things in the general course of events settle down to easy working, but owing to the constant changing of speed, due to the fact that the ship may be in line or performing some evolution, constant attention must be paid to the steam pressure. To relieve any excess of pressure and to prevent safety valves from blowing off, a silent blow-off is fitted. This is simply a bye-pass valve leading from the main steam pipe to the main condenser, and can be opened to relieve the pressure. It is only used in emergency, as a rush of live steam into the condenser, even when a baffle is fitted, may have a tendency to damage the tubes.

To regulate the firing of a boiler it is usual to fit an electrical device called a Kilroy firing indicator. This is fitted in the engine room, and can be adjusted to ring a bell in any stokehold every given number of minutes. Each furnace is numbered in this order:



and only one furnace is fired at a time, two men working together, one putting on the coal, the other opening and shutting the door. The plan adopted for cleaning fires is to do numbers 1, 2, 3 and 4 in one watch, and 5, 6, 7 and 8 in the next, and so on. The cleaning of tubes of water-tube boilers depends upon the quality of the coal used and the amount the fires are forced. The tubes of large-tube boilers are cleaned by means of a jet of steam or air discharged from a lance, and is generally carried out just before cleaning fires. Steam-cleaning of small-tube boilers is only done in case of emergency.

Stokers.—It may not be out of place to refer to the stokers of the Navy. A lad joins as a second-class stoker, and passes through the grades of first-class stoker, acting stoker, petty officer to the rank of chief stoker. There is also a rating of yeoman of stores, and one of engineer-writer, and the rating known as mechanician can also be reached. It is this rating which has given rise to so much discontent amongst the engine-room artificers.

Electricians.—Until within the last eight years all electrical work, such as running dynamos, wiring, searchlights and electrical work, was carried out by engine-room artificers, and it was usual to give a certain number of them a three months' course of instruction in the theory of electricity and then draft one to each ship. This has now been changed, and the lighting plants come entirely under the charge of an upper-deck lieutenant, generally the torpedo lieutenant, under whose order the electricians work. The uniform, pay and promotion of the electrician are identically the same as those of the engine-room artificer, although the electricians mess with the chief P.O.'s and not with the engine-room artificers.

Boilers.—The marine or cylindrical boiler is seldom seen in the Navy, but they are still to be found in despatch boats and tugs. The water-tube boilers are invariably used, owing to their lightness and ability to carry a high pressure and to the speed with which it is possible to raise steam. Boilers in which the internal diameter of the tubes is greater than 1½ inches are classed as large-tube boilers, those with tubes below that size are classed small-tube boilers. Examples of the former are: Babcock & Wilcox, Niclausse, Durr; of the latter, Thornycroft, White Forster, Reed, Normand. The Yarrow boilers are made with both large and small tubes.

Raising Ashes.—Various arrangements have been devised for removing ashes and clinkers from the stokehold, and ash ejectors are fitted to all the latest types of ship. The type known as See's ash ejector was found to work most successfully, but it left a trail of ashes in the wake of the ship, and to obviate that a later form of ejector is used in which the ashes and water are discharged through a pipe in the ship's bottom.

Feed Pumps.—In nearly every case the feed pumps are of the Weir type.

Water-Tight Doors.—To allow for communication, doors are cut where necessary in bulkheads and decks dividing the various water-tight spaces. These doors are of two distinct types, sliding and hinged. In all main transverse and longitudinal bulkheads, sliding water-tight doors are fitted. Where the coal bunkers lead into the stokehold, vertical doors are fitted, in the majority of other cases horizontal doors are fitted. Every water-tight door is divided into one of three classes and marked A, B, C. "A" doors are closed when the order "close water-tight doors" is given; "B" doors are kept closed when manœuvring or when entering or leaving harbour, at night, or in a fog; "C" doors are always kept closed when at sea.

Pumping and Draining. The main circulators are arranged to take their suctions if necessary from the engine room bilge, and a main drain of about 16 ft. in diameter is run from the after end of the forward boiler room to the forward engine room, a branch being taken to each engine room. By this means water can be carried from any stokehold bilge to either engine room. It is usual to fit a sluice valve and also a non-return valve in each stokehold. A sluice valve is also fitted between the two engine-rooms. For dealing with small quantities of water in the bilges, etc., suction pipes are taken to the fire and bilge pumps. These pumps and also the Downton pumps have connections to the main suction pipe. This is a pipe about 6 inches in diameter running the full length of the ship. Branches from this pipe are led to nearly every compartment in the hold and double bottoms, and each branch is fitted with a valve box which can be used as a non-return screw down and flooding valve. The magazines are not fitted with a branch to the main suction, and if it is necessary to pump out a magazine, a hose pipe would be rigged to the nearest Downton. In the latest and most modern ships the main drain has been dispensed with, and the main circulators can only take their suction from the engine-room bilges. The main fire and bilge pumps are arranged to pump from the engine-room space or double bottom directly under it. Arrangements have been made to pump out each boiler room and the spaces under it with a special pump. Outside the engine and boiler rooms motor-driven pumps of the centrifugal type have been fitted, which can be made to pump out the spaces in the compartments.

The Royal Naval Reserve.—Previous to the year 1904 it was possible for any mercantile marine engineer to become a commissioned officer in the Royal Naval Reserve. The fact of holding a Board of Trade certificate was considered sufficient qualification for his entry. Since that date entry as commissioned engineers has been entirely stopped and a new system substituted. Under this new scheme a few specially qualified engineers, holding first-class Board of Trade certificates and being under forty years of age, are to be admitted as warrant engineers provided they are recommended by their employers as having a thorough practical knowledge of the machinery of His Majesty's ships. The position of a warrant engineer is identically the same as that of an artificer engineer, with whom he ranks, but as this applies also to the warrant mechanician it does not count for very much in the eyes of the Admiralty. Cases are known where warrant engineers have been recommended for promotion by officers of as high a rank as rear admiral, and it has been refused, even though they have offered to give up their retainers. Apart from the question of mechanicians, the cabin accommodation will alone stop the best men from joining the Reserve as warrant engineers. When embarked for training or the manœuvres it is not uncommon to find the admiral's steward or valet allotted a cabin and the warrant engineer provided with a hammock, and this when working in three watches.

Whether the new officer scheme of entry has anything to do with the closing of the commissioned engineers' lists is a moot question, but, as previously suggested in a former issue, some form of examination might be held for mercantile engineers to obtain either direct entry as commissioned officers or be ranked from the lists of warrant engineers.

THE WATT ANNIVERSARY LECTURE for 1914, which was prepared by the late Dr. S. J. P. Thearle, formerly chief ship surveyor to Lloyd's Register, was read to the members of the Greenock Philosophical Society, Greenock, by the President of the Society, Mr. V. C. Meyer, on the 15th January. The late Dr. Thearle had taken for his subject "The classification of merchant shipping," and described the origin of ship classification and the purpose of a classification society. The useful service of such societies is pointed out in the paper, and his readers are asked to look upon ship classification as a necessity of maritime enterprise, something which is both essential and good, and a safeguard to evolution.

COMBUSTION OF OIL FUEL IN MARINE BOILERS.*

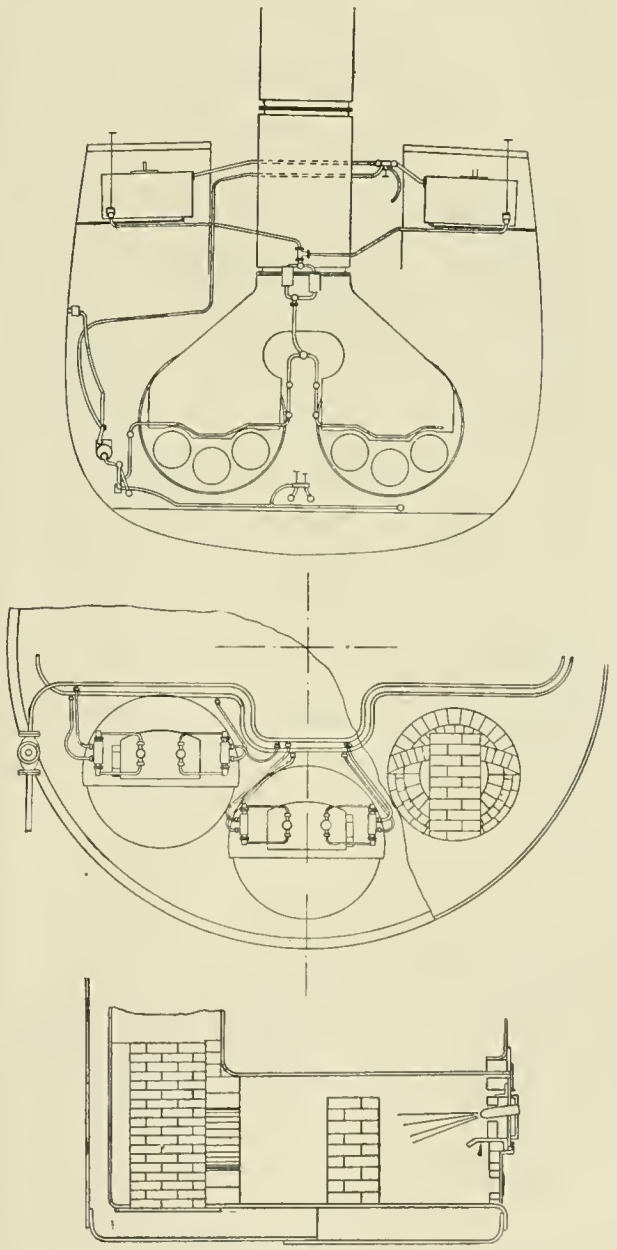
Continued from page 204.

THE presence of water in the fuel has a retarding effect on the decomposition by robbing the gases of the heat necessary for pulverization. A slight percentage will have a cooling effect on the striking block and large quantities will cause portions of the oil to be deposited on the striking block in the form of carbon. It is a difficult point to say exactly what percentage of water may be present in the oil without having a serious effect upon the fires, as the water separates mechanically on its passage to the fires and in the gravitation tanks. In an experiment made with special apparatus the actual energy lost by the presence of water in the fuel was found to be 13·14 B.T.U. per one per cent. water in addition to that lost by the absence of the quantity of oil which it replaces. In a ship burning 20 tons fuel per day, with a one per cent. mixture of water and assuming the value of the fuel at 18,000 B.T.U., the evaporative power of the boilers at the given consumption is decreased by more than one per cent. It is therefore an important matter to separate the water, if any be present. This is easily done in the gravitation tanks, and proper attention should be given by examining the drain cock on the tank before changing over.

The point has frequently been raised as to whether steam used for pulverization is actually burned itself along with the other products of the primary combustion consequent on the formation of hydrogen and carbon monoxide. If this were true the energy generated by the combustion of this steam should to some extent balance the steam supplied from the boiler for this purpose, which may range between five and ten per cent. of the total evaporation. In practice this is found to be a fallacy, and we may safely assume that any heat so generated only balances that given out by the burning gases to decompose the steam.

The air supply to the bottom of the furnace should be regulated by movable dampers, the quantity of air to be supplied depending naturally upon the rate of combustion. The full opening of the dampers of an ordinary marine boiler under running conditions should be about 30 sq. ins. per ton fuel consumed. This gives for an ordinary boiler an opening of about 9″ by 6″, and this may be reduced if possible, as too great an air supply tends to delay combustion. When running at reduced speed the dampers ought to be closed in as far as possible without forming smoke. On no account should the damper be full open when running easy, as a current of cool air is set up which may have a bad effect on tubes, exactly as with coal burning. On finishing with boilers, all ashpit and main dampers must be shut down, and it is an advantage to turn ventilators of the stokehold back to wind and close storm plates. Just as the initial heating effect of oil is greater than that of coal, so also is the cooling effect when fires are shut off, as we have no fires to burn down with a waste of fuel, as in the case of coal burning.

So far as marine boilers are concerned the principal, and we might say only, drawback to the steam system is the water consumption. Authorities differ widely as to the percentage of steam generated in the boilers for burner use compared with the total evaporation. The lowest figures available are those of the United States Liquid Fuel Board, at a trial of a Hayes steam burner. The percentage obtained in this case was 4½ per cent. of the entire evaporation. We must, however, remember that, in the words of the report "This boiler was piped to furnish steam for the steam burners, and has no other pipe leading from it." To compete with such a result on a sea-going vessel we require an impossible evaporator with an efficiency of 100 per cent. and no blowdown or condensing losses. In the case of the s.s. *Murex*, the consumption of water for all purposes, so far as engines and boilers



(1) Arrangement of the Oil fuel system on the s.s. *Murex*, Wallsend burners (page 202, January).

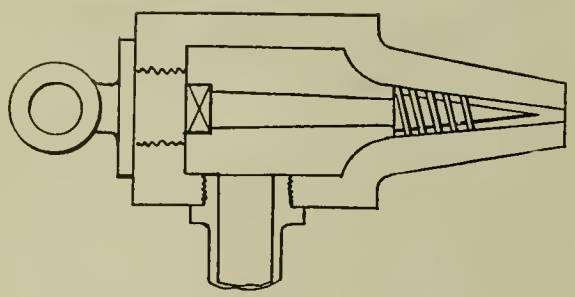
*Read before The Institute of Marine Engineers, December 15th, by Mr. Jas. S. Gander (member.)

are concerned, amounts to 10 tons per day. Allowing for engine and auxiliary losses 2½ tons, we are consuming 7½ tons per day for burner steam. Assuming an average evaporation of 14½ lbs. of water per pound of fuel, and a consumption in main boilers of 17 tons fuel per day, the percentage works out at 3. In actual practice, when making up the feed from an evaporator the condensing and blowdown losses considered with the efficiency of the evaporator raise the ratio to 5 per cent. In other words, on a consumption of 17 tons per day, ·85 tons fuel is used in making up burner steam supply.

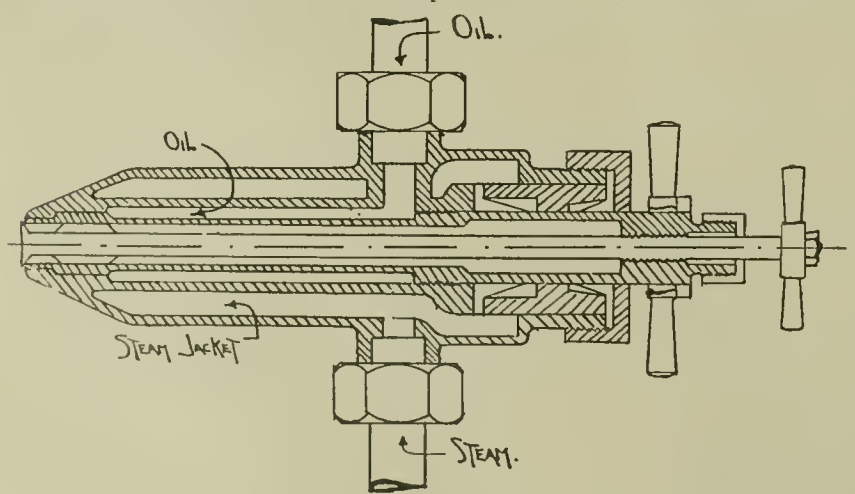
The steam with oil system has the merit of absolute simplicity, and where a cheap supply of fresh water is available, such as in river boats and for shore installations, will probably hold its own for some time yet on account of the cheapness of first cost. For ocean going steamers the direct-pressure system is found to be far more economical, the additional first cost being repaid in a few months by the 5 to 8 per cent. saving of fuel which may be expected.

THE DIRECT PRESSURE SYSTEM.—With the invention of Korting's burner, many years ago, begins the era of the direct pressure burner. Shortly after, a successful direct-pressure system was invented by Mr. R. A. Meyer, and was installed in the vessels of the Koninklijke Paketvaart Maatschappij, of which company Mr. Meyer was at that time the superintendent engineer. The direct-pressure system is so called because the fuel is injected into the furnace by pressure from a fuel pump through a burner, which is pierced at the end by a very minute hole. The fuel is heated and filtered before it arrives at the burner.

As in the steam with oil system the same precautions must be observed with regard to cleanliness of bunkers before loading and elimination of possible water afterwards. The oil being fed from pumps there is no need for a gravitation tank, but a tank should be supplied for the separation of water from the oil—this is not an absolute necessity, but a decided advantage. The pumps controlling the fuel pressure and supply are situated in the engine room convenient to the front platform. These pumps, of which only one is worked at a time, draw the oil direct from the bunkers or the separation tanks through a suction heater, and discharge through a delivery heater and filter to the burners. With the Meyer system, which is probably the most up-to-date and economical direct-pressure system, the filters and heaters are in duplicate, and are arranged to run separately or in couple as desired. It is advisable to change over the pumps every week, just as would be done in the case of any duplicate pump, to keep both in thorough working order. Suction and pressure gauges are fitted to the pumps, and a large air vessel maintains regularity of pressure. Steam for the heaters is supplied from exhaust of the pumps or direct from the auxiliary steam line, and the exhaust from the heater may pass through a separate coil in the main condenser or through a small auxiliary condenser circulated from the main pumps. The condensed water is led to an open tank divided into separation compartments, so that, in the event of any oil being present in the water, it is not possible for such oil to enter the feed supply. Leaving this tank the water is led to the main feed tank. The filters for an installation of this type are about 4 ft. in length—a brass frame covered with copper gauze of about 30 mesh. Under normal conditions the filters may be safely run for a fortnight before changing over to the duplicate. The heater coils should be cleaned every three months, and more often if water has been present in the oil, as this tends to form a slight scale at the bottom of the coils which reduces their heating effect. The construction of heaters and filters is such that the operations of examination and cleaning are easily and quickly effected. The heaters should be fitted with small drain cocks, as it is in this part of the system that we can thoroughly eliminate any trace of water in the fuel.



(3) Korting's Direct-Pressure Burner (page 260).

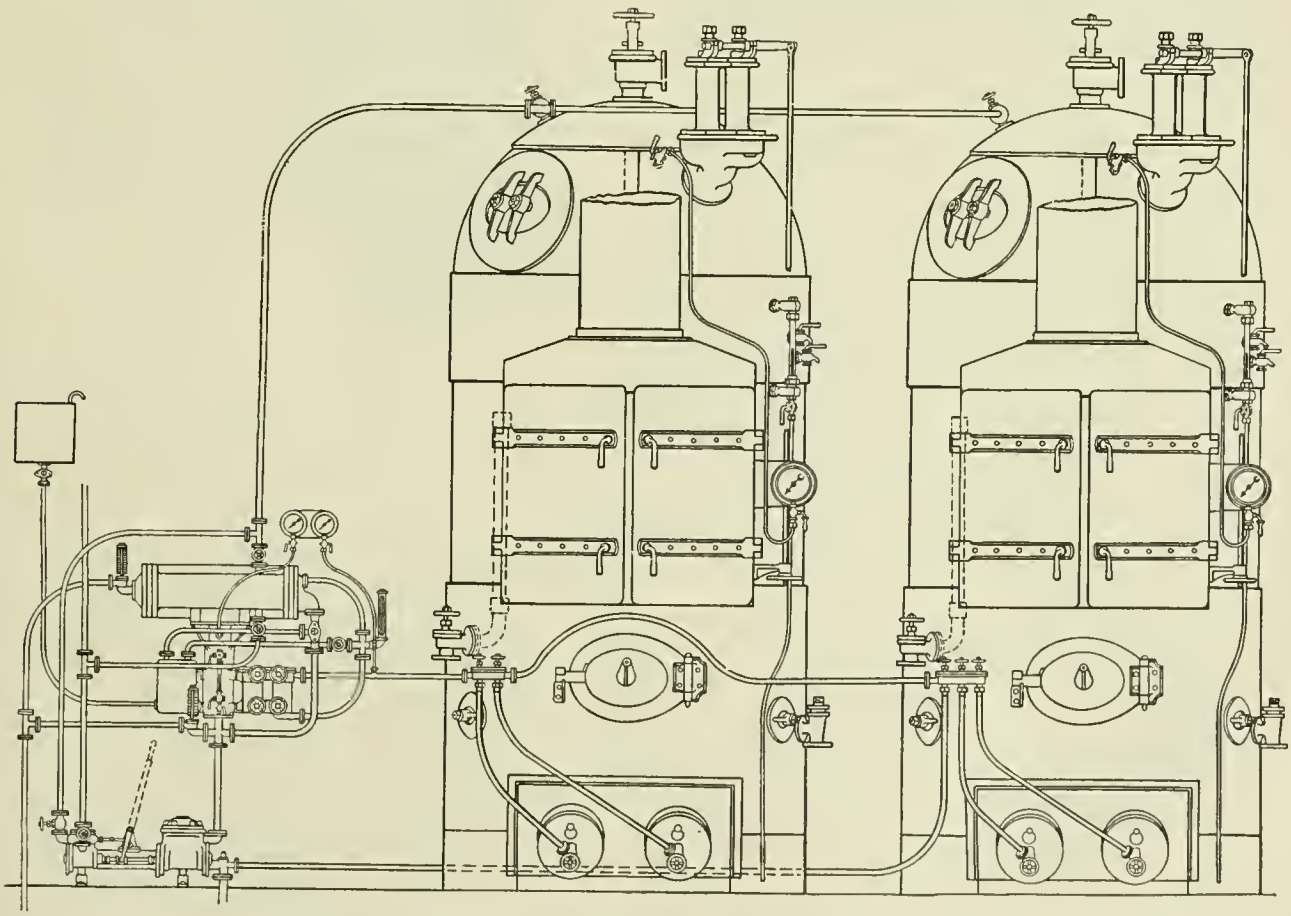


(2) Oil Fuel Burner (Rusden & Eeles') (page 203, January).

With the direct-pressure system it is very necessary to drain off water and filter the oil before it passes to the burners. If proper attention be given to this matter no trouble will be given by burners choking or by defective combustion in the presence of water. It is remarkable how long these burners will run without attention and cleaning, when we consider that the orifice is so small that little more than a pint passes through in one minute under a pressure of 30 lbs. per square inch. A special needle is supplied for cleaning the orifice in the burners, and a testing apparatus enables

the engineer to test the burners before fitting them in position on the furnace. The simple attachment of burners to the distribution boxes renders the matter of cleaning or renewing a very easy job. The triple thread which is cut at the end of the internal needle imparts a spiral motion to the passing oil which tends to keep the orifice scoured and also assists in the atomization. The temperature at which the oil will give the most economical results depends upon its nature and gravity. An average mixture of fuel oil will require to be heated to about 160° Fahr., Tarakan crude to about 120°, and some of the heavier European residue to as much as 240°. All other things being equal, the correct adjustment of temperature and pressure are most important items in the efficient working of the direct-pressure system. This is a very simple matter. If the oil be too cold the spray will enter the furnace without igniting, if too hot the same will ignite as it leaves the orifice. With the correct temperature the flame should appear at little more than one inch from the burner. The best results are obtained with a fuel pressure of from 30 to 40 lbs. The colour of the flame gives the same indications as in the steam and oil system. With double-ended stokeholds and consequently long leads of fuel pipes a small additional heater may be fitted to the fuel line most remote, in order to maintain an equal temperature to all the supply. If the piping is so arranged that an efficient circulation of the fuel takes place, this is not necessary.

The construction of the furnace fronts and the air rings are a distinguishing feature of the Meyer system and a text-book description of the first type will enable the recent improvements in the latter to be more readily appreciated. "In the front ring of the furnace is fitted an annular ring B, fitted with metal strips C, secured edgewise upon and around its external surface so as to traverse it longitudinally, an interval space being left between each strip. These spaces form air channels to conduct the air, which is heated by the fuel burning inside the ring. To delay the incoming air more or less in these channels, so as to give it ample opportunity to receive the heat, the strips are arranged so as to traverse the perimeter spirally. The ring is made in two or more short lengths, so as to facilitate its manufacture, the different lengths being kept somewhat apart, thus forming circular openings through which part of the air enters and ignites the fuel inside the apparatus. The rest of the air comes in contact with the fuel on emerging from the end of the channels D. The annular space formed by these channels, by which the air enters at the stokehold side, is provided with a suitable damper, properly guided and rendered adjustable, so that the amount of air entering can be nicely regulated. Inside the annular part of the arrangement for air inlet, the conductor ring is closed at the stokehold side by the cover G, which is made in two pieces, the fixed part carrying the injectors, the loose part giving opportunity for inside inspection



(4) Typical Donkey Boiler Installation, showing complete Oil-Fuel system for two Cochran boilers (page 260).

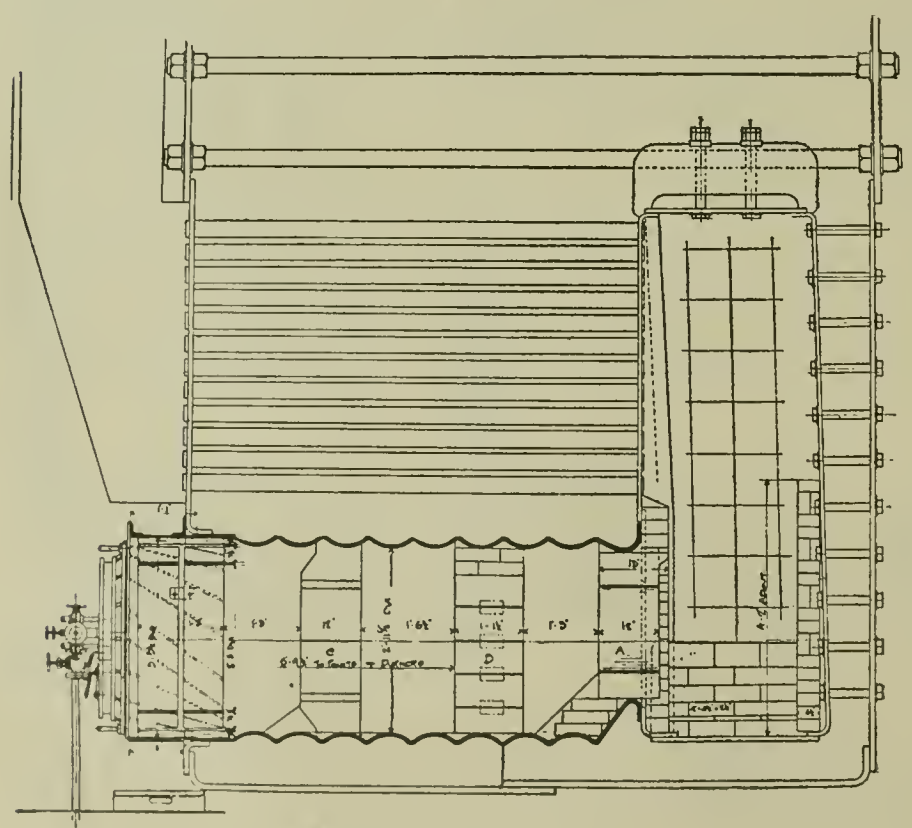
of the furnace." Special attention should be paid to the removal of carbon deposits from the brick ring, and a light slice, as described previously, should be employed. Too heavy a slice in the hands of a careless operator may destroy parts of the brickwork. For the regulation of fuel temperatures thermo pockets are fitted in the pipes at the heaters and on each furnace front. The temperature can be raised or decreased all round the system in a few minutes. Before lighting up the oil should be circulated round, furnace front dampers opened a little and the fires ignited at the temperature which previous experience of a similar grade of fuel advises.

The direct-pressure system on the Meyer principle has quite recently been greatly improved. Formerly, the furnace fronts were of the heavy cast-iron type, and were somewhat cumbersome when changing from coal to oil or *vice versa*. These are now made of sheet steel of an improved design, with the result that the operation of changing over is greatly simplified. The new type embodies all the advantages of the old, the incoming air is heated, and has a rotary motion imparted to it by the retarding vanes. To carry out the idea of reducing weight to a minimum, the damper construction has been simplified and the internal vanes in this part dispensed with. The initial heating effect on the air supply may possibly be less with the new type of front than with the old, but this is compensated for by the improved and accelerated rotary motion obtained. In the writer's opinion apart from the question of the reduction in weight, the chief advantage of the new furnace front lies in the fact that the incoming draught is directed by the conical inside baffle and enters the furnace about the centre and not at the sides. In practice the flame appears to cover and enwrap the whole circumference of the furnace, and by admitting the heated air at a point near the centre of the furnace instead of at the sides, as in the old type, contact of cool air with furnace sides is rendered impossible.

With the new system, or the Meyer-Smith system as it appears to be called, certain changes have been made in the construction of the burner. In the old type the needle was not adjustable, the quantity of oil passing depending entirely on the diameter of the orifice and the fuel pressure. With the latest type of burner an external thread is cut on the triple thread at the end of the needle, and by turning the small handwheel, which is fitted to the other extremity, the needle may be advanced toward or withdrawn from the orifice. This operation alters the shape of the spray. Once the correct shape is struck, a matter of a few seconds, the needle is left in that position. An important addition also to this burner is the small filter which fits over the needle and arrests any impurities which may have passed the main filters. With the Meyer-Smith system the furnace brickwork is dispensed with. The only brickwork used with this system is the back end wall at the neck of the furnace which limits the area of the opening to the combustion chamber and protects the adjacent seams, and the usual wall around the combustion chamber to cover stay nuts and seams.

Comparing the Meyer with the Meyer-Smith system the latter possesses the following advantages :— Quicker handling of the furnace fronts in changing from coal to oil. Improved rotary motion imparted to the fires. Dampers more convenient of adjustment. Cheaper first cost and renewals (according to makers' claims).

(To be continued.)

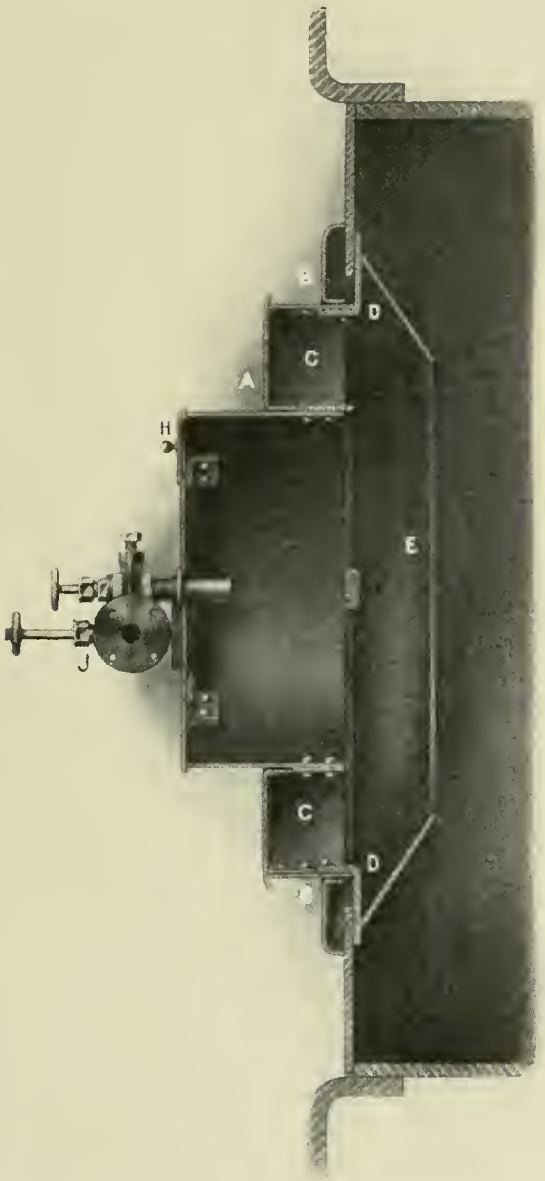


(5) Meyer System (First Type) (page 261.)

MR. G. CONSTANTINESCO, of 8, Lichfield Road, Kew Gardens, W., inventor of the G.C. Vaporizer announces that he has ceased to be connected with the G.C. Vaporizer (Foreign Patents), Ltd.

MESSRS. THE WELIN DAVIT & ENGINEERING CO., LTD., inform us that the two steamers building for the Royal Mail Steam Packet Co., by Messrs. Workman, Clark & Co., will be fitted with Welin davits throughout.

SIR WILLIAM BEARDMORE, BART.—The list of New Year honours included the conferment of a baronetcy on Mr. William Beardmore, chairman and managing director of Messrs. William Beardmore & Co., Ltd., the well-known firm of shipbuilders and engineers, of Dalmuir.



(6) The New "Meyer-Smith" Oil Burning Furnace Front. Material, Sheet Steel.

A.—Circular sliding damper controlling air supply through the inner heating passages C. B.—Circular sliding damper controlling air supply through the outer heating passages D. C.—Air passages with spiral vanes for heating and imparting rotary spray motion to air entering furnace to ensure complete mixing with oil spray. D.—Outer air supply and heating passages. E.—Steel plate cone to form heating passage and direction plate. F.—Flat steel extension plate to fit furnace mouth. G.—Front plate of furnace to which burner boxes are fixed. H.—Observation and lighting up door. J.—Burners complete with Gun metal distribution box.

SIR DAVID GILL, K.C.B.—As we go to press, we hear with the deepest regret of the death of Sir David Gill, which took place on 24th January at his house in Kensington. The famous astronomer, born on the 12th June, 1843, was the eldest son of the late David Gill, J.P., of Blairythan, Aberdeenshire, and was President of the Institute of Marine Engineers during the Session 1910-11.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

A YEAR singularly free from mishap as far as the principal public dockyard was concerned ended with a catastrophe which not only caused the death of two signalmen, but the loss of buildings and property valued at several thousands of pounds. The fire, which broke out on the evening of December 20th, seems to have been the most serious that has occurred here for over a century at least. At the same time, thanks to the more or less isolated character of the buildings in which it started, which were on a sort of peninsula of reclaimed land, and to the hard work of the numerous brigades from shore stations and ships in harbour, there is good cause for gratification that the blaze was confined to the vicinity of the South Railway Jetty, the scene of so many arrivals and departures of royalty and other distinguished personages. The block of buildings destroyed consisted of the sail and flag lofts, and the rigging house, whilst above them was the semaphore tower, the principal signalling station of the port. The buildings had been in existence for 134 years, and the tower about 100 years. Being built mainly of wood, and forming a kind of funnel which drew up the flames, there was little hope for the tower when once it caught alight, and of the three signalmen on duty only one succeeded in escaping to the open flats in time to save his life, and even he fell insensible from the smoke just as he got free of the tower. Neither by the inquest nor other means has the probable cause of the fire been ascertained. It undoubtedly began in the sail loft, but the jury were of opinion that it was not caused by an incendiary, nor by the fusing of electric wires, nor by a coal gas explosion, nor by anyone smoking nor by a fire from an open grate. The evidence was not even sufficient to cause them to attribute it to spontaneous combustion. The arrangements made for signalling owing to the demolition of the tower have resulted in a minimum of inconvenience. The dockyard signalling station, over the pumping house, is being used as the principal port station, and a battleship was told off to assist in regard to visual signalling. It is not yet known what steps will be taken to rebuild the sail and flag lofts and rigging house, nor where the new tower will be erected. A beginning has been made with the *Royal Sovereign*, of the current year's programme, her keel being laid on January 15th. Some curious comments have been made in certain newspapers about her design, it being asserted that it is smaller, slower and less powerful than that of the "Queen Elizabeth" class, which is taken to mean that the Admiralty intend to reduce the size and cost of future battleships, instead of making each new type an advance on its predecessor. It must be remembered, however, that the *Queen Elizabeth*, of 27,500 tons, 25 knots, eight 15-in. guns, and burning only oil for fuel, is an exceptional type, approaching as much to the battle-cruiser as to the battleship. Mr. Churchill said in July last that the next group of ships would not be for service as a fast wing of the battle fleet, and coal would be their main source of power. Therefore, they should be compared, not with the "Queen Elizabeths" of 1912-13, but with the "Iron Dukes" of 1911-12, when it will be found that there is about the same all-round advance that has been characteristic of each new battleship type. In regard to armament, the change from 13·5-in. to 15-in. guns will result in a great accession of strength. There has been a meeting during the past month of dockyardmen to protest against the new form which has to be signed before men can be placed on the established list, it being alleged that the power taken by the Admiralty in this form to transfer men to any other yard is subversive of the rights of citizenship, and may be used to assist the authorities out of labour disputes. At the moment of writing the men are sanguine that they will induce the Admiralty to modify the form which is causing the trouble.

Devonport Dockyard.

On January 15th, the same day that the *Royal Sovereign* was begun at Portsmouth, the keel of the battleship *Royal Oak*, was laid down at Devonport. The delay in begin-

ning these ships has been attributed to various causes, but there is a general belief that it is not unconnected with the acceleration of the contract-built ships in the programme, which it will be remembered were begun in November instead of in March owing to the rejection of the bill for the provision of three Dreadnoughts by Canada. At any rate, it seems unlikely that the *Royal Oak* will earn all the money set down for her in the original Estimates, and in this event the balance may be taken to pay the larger sum which the contractors will need for work on the *Revenge, Romillies* and *Resolution*. A sum of £214,534 was allotted to the *Royal Oak* in the Estimates of March last, and the ship has been laid down less than three months before the close of the financial year. In 1912-13 a sum of £166,073 was devoted to the *Warspite*, which was laid down on October 31st, 1912, or five months before the end of the financial year. These figures illustrate that there has been a change of plan in regard to the dockyard ships of the 1913-14 programme, for it is inconceivable that the *Royal Sovereigns* could have been intended to earn about £50,000 more in three months than the *Queen Elizabeths* earned in five months. Work continued from 1913 is proceeding satisfactorily. The battleship *Marlborough*, of the 1911-12 programme has now been two years under construction, and although not yet ready for the pennant she is expected to be so in March, when it is stated she will relieve the *Collingwood* as flagship of the Vice-Admiral Commanding the First Battle Squadron. Within a few months, the *Marlborough* will be followed into commission by the light cruiser *Aurora*, which was launched on September 30th last, and by the oil tank vessel *Carol*, launched on July 5th. There is no diminution of refitting work apparent in the yard, and altogether the prospect of there being a full programme of work during the coming financial year, in connection with which the Director of Dockyards, Sir J. B. Marshall, visited Devonport and conferred with the leading officials on December 30th, is a good one. The long refit of the cruiser *Essex*, has been completed, and the vessel was commissioned on New Year's Day for the Fourth Cruiser Squadron, to join which she has since left for Bermuda. Her sister-ship, the *Monmouth*, has been paid off to undergo a similar long refit. It is now about ten years since these "County" cruisers were first commissioned, and so they are gradually being passed into dockyard hands for lengthy overhauls. Following closely upon the sinking of submarine C.14 off Devil's Point on December 10th, the loss of submarine A.7 on January 16th, caused a great shock. As mentioned last month, C.14's crew were all saved, but, unfortunately, A.7 took down with her the full complement of two officers and nine men when she disappeared about four miles off Rame Head. At the moment of writing there is an element of mystery about the whole affair. All previous submarine disasters have been caused by collision, except in the case of A.8, which was swamped by water entering the conning tower owing to an unexplained lurch of the bows when the vessel was stationary. A.7, however, failed to rise after a dive, and there is nothing yet to show what made her sink. She was one of the oldest boats in the Service, and had been attached to this port for the eight years or more she has been in commission. Attention was directed by the accident to an apparent lack of craft at this yard suitable for raising submarines. There are vessels, of course, which could lift a sunken submarine, though not perhaps from the 23 fathoms in which A.7 was found five days after the disaster, but the authorities found it necessary or expedient to telegraph for yard craft No. 94, which has the best submarine salvage equipment in the navy, to be sent round from Sheerness. In the course of this year, however, the Admiralty should be able to station a submarine salvage lighter here when the two such vessels now building by Messrs. Finch & Co., Chepstow, and rhe Dundee Shipbuilding Co., Dundee, are delivered. The value of such craft was indicated by the prompt manner in which the hull of C.14 was raised on December 19th, the actual salvage operation only occupying thirty hours.

Chatham Dockyard.

The first fortnight of the New Year was marked by the beginning of the light cruiser, *Calliope*, on No. 8 slip, and by the commissioning of the light cruiser *Lowestoft*. The *Calliope* belongs to the second group of light armoured cruisers, of high speed, and burning only oil as fuel, which form such an interesting feature of present construction programmes. The slip on which she has been begun was that on which the *Lowestoft* was built, and a sum of £50,424 is allotted to be spent on the new vessel before the end of March. Owing to the disinclination of the private yards to undertake the building of the five light cruisers originally allotted to them out of the eight in the current year's programme, there will be two such vessels instead of one built at Chatham. The *Conquest*, as the second vessel will be known, is to be begun shortly in the dock from which the *Arethusa* was recently floated out. As to the *Lowestoft*, she is using Devonport as her base during trials, and it has not been officially stated to which squadron she will be attached on completion. She commissioned on January 9th as tender to the depôt-ship at this port. Among the dockyard workmen a principal topic of discussion has been the new form which has been introduced for men to sign before being placed on the establishment. According to this document the Admiralty have the right to transfer workmen from one place to another if they deem it necessary or advisable. The contention of the men is that this power might be used as a weapon to break strikes, because in the event of a dispute at one yard, public or private, the Admiralty could shift a number of workmen from another yard to carry on essential work. The official view, however, is that nothing of this kind is intended; the power sought by the Admiralty would only be resorted to in cases of emergency, and then only to complete urgent work for which there were insufficient workmen at the particular yard involved. It might be desirable, for example, to repair a damaged warship at Devonport because of the lack of a suitable dock at Portsmouth, although the latter yard might have more men available for the work. In view of the Admiralty's assurance that the new form has been devised on grounds of national security alone, it is probable that the agitation against it will quieten down before long.

Sheerness Dockyard.

The large fleet which came into the Medway to give Christmas leave has now dispersed, and by the time these lines appear many of the vessel will be as far away as Vigo and Gibraltar. Off the former place some important combined exercises are to be held during February under the command of Admiral Sir George Callaghan. It will be a change for the squadrons to put in some of their fleet training in the Atlantic, off the Spanish coast, as in recent years they have spent most of their time in the Channel or North Sea. There remains in harbour the Nore division of the Fifth Battle Squadron, consisting of four battleships of the Bulwark type. The arrivals during the past month have included the *Proserpine*, from the Mediterranean, which paid off on January 8th to join the Third Fleet at the Nore, and several destroyers. The growth of the Eastchurch Flying School is indicated by the announcement that during 1913 there were 29 officers, petty officers, and men who qualified for aerial pilots' certificates. This latest branch of the Navy has become more than ever identified with Sheerness now that the *Hermes* has paid off as parent ship of the air service and the headquarters have been transferred to the depôt in the dockyard. Lieutenant W. Highfield and the officers and men under him have been complimented on their successful efforts to raise the hull of submarine C.14, which sunk off Plymouth in December. Lieutenant Highfield, who is attached to the Commander's Department here, proceeded to the western port with No. 94 yard craft, which was specially fitted for salvage work with submarines as a result of the experience gained with the attempts to raise C.11 in 1909. The work of locating the wreck, fixing hawsers, and raising the hull from a depth of twelve fathoms was accomplished in thirty hours. This was the first time a submarine of the "C" class had been salved, and the occurrence afforded a striking testimony to the efficiency of No. 94 yard craft and the officers and men employed on the work. At the annual dockyard sale here on January 13th, the unusual spectacle was witnessed of an obsolete battleship not finding a purchaser. This was the *Royal Oak*, launched by Laird's yard at Birkenhead in 1892. The Admiralty reserve price for the old ship was not reached, although the bidding went up to

£37,000. Oddly enough, this was the first time, so it was said, that a battleship had figured in the dockyard sales at Sheerness. The *Royal Oak* has since been sold to Messrs. Ward, of Sheffield.

Pembroke Dockyard.

The *Nottingham,* light cruiser, of the 1911-12 programme, has now completed her official trials, and is fitting out for commissioning. The speed tests were run in the Firth of Clyde, the measured mile off Skelmorlie being used, and such reports as are obtainable indicate that they were satisfactorily completed. The *Nottingham* should be ready for the pennant quite as early as her sisters, the *Birmingham* and *Lowestoft,* which are fitting out at Elswick and Chatham respectively. No doubt all three of these cruisers will be drafted to the First Light Cruiser Squadron. There has been delay in the delivery of material from the contractors, principally four shaft brackets, for use in the light cruiser *Cordelia,* and consequently the launch of the vessel has been postponed from January 21st. At the moment of writing, it is not known when the *Cordelia* will take the water, but it is certain to be before the end of the financial year on March 31st, as a sister-ship, the *Carysfort,* is to be laid down before then. Steady progress is being made with the oil carriers *Trefoil* and *Turmoil,* the former of which is completing afloat, and the latter building on the stocks. There is plenty of refitting work in hand, for the arrival of the *Kale,* destroyer, last month, has increased the number of destroyers under repair to three. Of these, however, the *Thorn* has finished her retubing refit, and at a second attempt has had a successful after-repair trial.

MARINE BOILER EXPLOSIONS.

AMONG the reports issued by the Board of Trade recently occur a few which are of interest to the marine engineer, and are well worthy of reference. The main boiler of a small coasting steamer exploded, fortunately without injuring anyone. The boiler was of steel, with iron tubes, and of the ordinary single-ended marine type. There were two plain furnaces each having a separate firebox. The principal dimensions of this boiler were—Shell diameter 12 ft. 6 in., length 10 ft. 3 in., shell plates $1\frac{1}{16}$ in. thick, in two pieces with treble riveted, double butt straps, furnaces 3 ft. 7 in. external diameter, 6 ft. 7 in. long, wrapper plates $\frac{5}{8}$ in. thick, the crown plates being stayed by six girders with stays screwed into the plate and nutted. Two spring safety valves were fitted for a working pressure of 160 lbs. per square inch. On leaving port the water in the boiler was stated by the attendant to have been $1\frac{1}{2}$ in. from the top of the glass, and during his watch the water appeared to be rising, this he thought might be due to the condenser leaking. As the water still seemed to be gaining he opened the blow down for a few minutes without any apparent effect. About midnight he heard a report while in the engine-room and at once stopped the engine; a second report followed and the stokehold and engine-room were filled with steam. The attendant and fireman escaped on deck and the vessel was subsequently towed into port. On examination it was found that ten stay nuts had been forced off the girder stays of the port combustion chamber, and the crown plate had collapsed about 5 in. There were no signs of wastage and the plates were practically free from scale. The water gauges and mountings were found to be clear and in good working order. When the water was just showing in the glass there was about $3\frac{1}{2}$ in. over the combustion chamber crown. The inference drawn from the investigation was that the attendant had mistaken the quantity of water in the boiler and the glass had shown false water, due to a valve being shut or a pipe being choked; had he known, as he should have done, how to apply the test he would have saved the boiler from disaster. Another explosion occurred in the boiler of a steam trawler, fortunately without causing injury to life or limb. The material of the boiler was steel; it was 12 ft. diam. by 9 ft. 9 in. long, with two corrugated furnaces, $42\frac{1}{2}$ in. diam. at the plain parts and $46\frac{1}{2}$ in. diam. over the corrugations. The front end was made up of two plates, the top being $1\frac{1}{16}$ in. thick, and the lower $\frac{15}{16}$ in. thick, flanged inward for the furnaces, to which it was double riveted. The spring safety valves were loaded to 200 lbs. It was fourteen years old, and a new starboard furnace and port fire-box had been fitted in 1905. As the original furnace had been welded to the back tube plate, a new saddle plate had to be fitted. When the repairs were completed the boiler was tested to 300 lbs. hydraulic pressure. The vessel proceeded on a run towards Iceland, and, having arrived at the fishing area, the engines were stopped and preparations were made to shoot the nets, and the deck machinery was got ready. The engine driver, on returning below, heard some steam blowing, and tracing it to the stokehold, found the plates covered with hot water and the passage ways full of steam. As soon as the place was clear, he found the front end-plate fractured above the port furnace for about 22 in., and he was able to insert the blade of a knife in the centre of the crack. A temporary repair was effected by means of $\frac{1}{2}$ in. studs at each end of the crack, and the plate caulked. This was enough to enable steam to be raised, sufficient to shift to safer anchorage. This being accomplished, the boiler was again emptied, and the length of the crack was laced with $\frac{1}{2}$ in. and $\frac{5}{8}$ in. studs. This repair admitted of bringing the vessel back to her starting port with 90 to 95 lbs. pressure, but as the fires were allowed to cool down the crack opened out and leaked. The cracked part of the plate was cut away and welded up; a covering patch of $\frac{9}{16}$ in. Low Moor plate was also fitted inside the boiler. A similar covering plate was also fitted over the starboard furnace, and both corrugated furnaces were removed and replaced by plain furnaces. The giving way of the plate was attributed to panting action, caused by the expansion and working of the furnaces, gradually leading to an almost imperceptible grooving, ultimately ending in rupture.

CATALOGUES AND LEAFLETS have been received from a number of firms, describing and illustrating their specialities. Copies will be sent to anyone interested upon application to the addresses given. MESSRS. WAILES, DOVE & CO., LTD., Newcastle-on-Tyne, "Bitumastic" enamels, coverings and solutions for the protection and preservation of bunkers, holds, peaks, ballast tanks, tank tops, anti-rolling tanks, etc. THE NEWALL ENGINEERING CO., Walthamstow, London, E., gauges, micrometers and measuring machines (Catalogue No. 150). CRUSE CONTROLLABLE SUPERHEATER CO., Manchester, superheaters, etc. (Catalogue No. 14). MESSRS. W. A. WALBER & CO., 38, Victoria Street, Westminster, "Victor" and "Vilvalle" oil, gas and petrol engines (Catalogue No. 31). AMERICAN BRASS CO., Ansonia, Conn., U.S.A., "Tobin" bronze, for purposes where a bronze resistant to corrosion and of high tensile strength is required. MESSRS. PERKIN & CO., LTD., Junction Works, Leeds, a short treatise on hack saw machines, and List No. 154 on the "Perco" bench miller. MESSRS. PETTERS, LTD., Yeovil, Somerset, and 73, Queen Victoria Street, London, new catalogue of Petter semi-Diesel crude oil engines up to 200 B.H.P. (Catalogue No. 317). MESSRS. J. W. BROOKE & CO., LTD., Adrian Works, Lowestoft, an up-to-date catalogue of their industrial motors. WOLVERINE MOTOR WORKS, Bridgeport, Conn., U.S.A., Catalogue N. of "Wolverine" oil and gas engines for marine service, also a more complete catalogue of marine engines from 5 to 100 H.P. FRISBIE MOTOR CO., Middletown, Conn., U.S.A., describing and illustrating "Frisbie" motors. SIRIUS AUTOGENOUS WORKS COMPANY, High Street, Stratford, London, E., latest illustrated catalogue of standard and portable acetylene generators for oxy-acetylene welding and cutting. The advice of the Company's experts is at all times at the service of interested persons. MESSRS. IRWIN & JONES, London House, New London Street, E.C., "Geji" Buffalo belting described. MR. S. N. BRAYSHAW, Hulme, Manchester, "Brayshaw" specialities, furnaces, pyrometers, steel hardening, cutters, etc. (List 48F.); has recently opened branch works for the furnace department at Vernon Street, Longsight. AILSA CRAIG MOTOR CO., LTD., Chiswick, W., "Ailsa Craig" semi-Diesel oil engines and how they work. MESSRS. T. W. BROADBENT, LTD., Victoria Electrical Works, Huddersfield, Catalogue No. 11 on "D" type continuous current generators, 100 to 500 k.w., for direct coupling. LEAD, LTD., 1-2, Old Pye Street, Westminster, lead-coated metal work and machinery. MESSRS. FIELDING & PLATT, LTD., Gloucester, the "Fielding" suction gas engine. MESSRS. BENZ & CO., Mannheim, "Benz" marine motors. MESSRS. SMITH'S DOCK CO., LTD., Bull Ring Works, North Shields, a catalogue produced in excellent style, describing and illustrating the Meyer-Smith oil-burning installations.

ELECTRIC STARTERS AND REGULATORS FOR SHIPS AND SHIPYARDS.

THE wide application of electricity on board ship has involved starters and speed regulators being used very extensively for controlling electrically driven ventilating fans in both the passenger and the crew accommodation and for controlling motors driving forced draught fans; and further, self-acting starters are now used very largely for automatically controlling pumps, compressors, capstans, winches, boat and baggage hoists and passenger elevators and other kinds of machinery, which are now very largely driven by electric motors. It will be recognised that when this class of mechanism is used for shipboard or shipyards the control gear must be of a strong and robust character, as simple as possible in design, so as to offer the smallest possible chance of getting out of

Fig. 1.

order, and "fool-proof," so that it may be operated by practically unskilled labour. It is claimed that "Igranic" controllers, manufactured by the Igranic Electric Co., Ltd., of 147, Queen Victoria Street, London, E.C., combine all these features and can be relied upon as being particularly suitable for shipboard and shipyard use.

Referring to the accompanying illustrations, Fig. 1 shows an "Igranic" compound starting and speed regulating rheostat, for use with shunt-wound and compound-wound motors, driving ventilating fans, and forced draught fans. It is fitted with automatic no-voltage release, and automatic overload release, and sufficient field resistance can be supplied, to increase the speed of the motor driving the fan up to 300% above the normal, *i.e.*, 4 to 1 speed variation. To start the motor, the attendant simply moves the auxiliary lever which carries the main starting lever, from the "off" to the "full-on" position, when the main starting lever is held magnetically by the "hold-on" coil. To regulate the speed, the auxiliary lever is moved back over the regulating

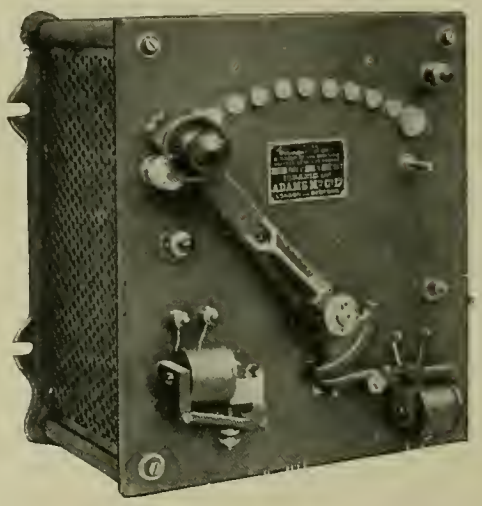


Fig. 2.

contacts and can be left in any position corresponding to the required speed of the fan, which is regulated, of course, according to the atmospheric conditions prevailing. If desired the speed of the fan can be predetermined by the steward or whoever has charge of the fan and the regulator adjusted so that the speed cannot be altered by any unauthorised person, such as a passenger or member of the crew. When this is done, the steward sets the desired speed by a small hand-wheel, provided for the purpose, then closes and locks the case of the regulator. The motor can then be started and stopped as frequently as required without opening the case, but the speed can only be altered by the possessor of the key.

A patent electrical and mechanical interlock is provided, which ensures a full field every time the motor is started. These devices are made in sizes from ½ H.P. up to 50 H.P.

Fig. 2 is an illustration of an "Igranic" combined starting and series-regulating rheostat for starting the motor and reducing the speed by armature resistance. This is fitted with automatic no-volt release

Fig. 3.

and is designed to reduce the speed 50% of normal, or even more when required. This type also has only one handle to manipulate, which greatly simplifies the control of the fan and makes it eminently suitable for shipboard use. This is also made in standard sizes from ½ to 50 H.P.

Figs. 3 and 4 show smaller types of speed regulators for controlling small fans, vibrators, desk and ceiling fans.

The self-acting starter, illustrated by fig. 5, has already been very largely used for shipboard use, as well as for use in the shipbuilding yards. It consists of an "Igranic" combined self-acting motor starting rheostat, with interlocked clapper type main switch, and its chief use is for the remote control of motors, driving capstans, winches and hoists of various kinds, including boat and baggage hoists, and passenger elevators. It enables the motor to be started and stopped from any number of remote points by means of a push button, tumbler switch, or any pilot switch of small ampere capacity.

We understand that this type of self-starter is also used extensively for automatically starting up the motor generator sets in connection with the Marconi Installations, and further that one of the largest shipbuilding yards on the Clyde have an installation comprising twenty-six of these "Igranic" self-acting starters controlling motors driving punches and shears. This

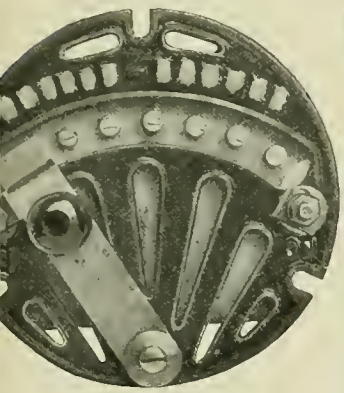


Fig. 4.

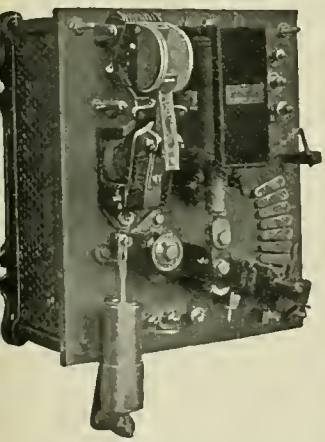


Fig 5.

Fig. 6.

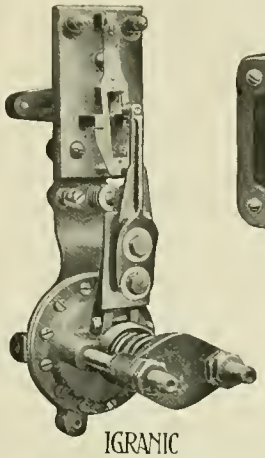


Fig. 7.—Pressure Regulator for starting and stopping automatically according to varying air pressure used for compressed air plant in shipyards.

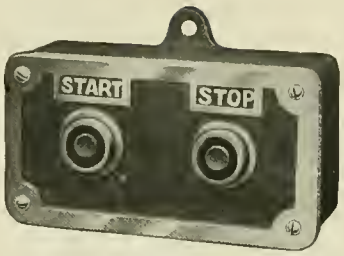


Fig. 8.

Start and Stop Remote Control Push-button Box.

is universally recognised as a very difficult service to be met owing to the fact that the starting period must necessarily be prolonged, in order to allow the motor to pick up against the inertia of the fly-wheels and other heavy moving parts. With this self-acting starter the operator is relieved entirely of the responsibility of starting slowly as the time allowed for starting the motor can be predetermined and the self starter adjusted to start up correctly whenever the "start" button or "master" switch is operated. This type of starter can also be used for automatically controlling motors driving hydraulic pumps and air compressors, used in every shipyard for riveting. The "Igranic" patent multiple contactor type of self-starter (Fig. 6) is used for similar purposes, but for higher horse powers. In conclusion, it is well to remember that the control gear should be protected effectively by suitable methods of enclosure. When installed in positions exposed to the elements it should be water-tight, but when installed in cabins and between decks in sheltered positions this question of enclosure can be met by using less expensive methods of enclosure.

POST-GRADUATE SCHOLARSHIP IN NAVAL ARCHITECTURE, 1914.—The Royal Commissioners for the Exhibition of 1851, acting on the recommendation of the Council of the Institution of Naval Architects, have awarded the Post-Graduate Scholarship in Naval Architecture for 1914 to Mr. C. Frodsham Holt, of Liverpool, who recently obtained a first-class Honours Degree at Liverpool University. The scholarship is of the value of £200 per year, tenable for two years, and the holder proposes to carry out research work in present-day mercantile ship construction, with a view to improvements in design.

THE UNION IRON WORKS CO., of San Francisco, have contracted for the construction of a tank steamer 420 ft. by 54 ft. by 31 ft. 6 in., to carry about 9,200 tons deadweight. This vessel will be a duplicate of the s.s. *Richmond*, built on the Isherwood system, and for the same owners, namely, The Standard Oil Co. The Gulf Refining Co., of New York, U.S.A., have contracted with The New York Shipbuilding Co., of Camden, New Jersey, for the construction of two oil tank steamers 383 ft. by 51 ft. 2 in. by 30 ft. These vessels will be duplicates of the s.s. *Gulfoil*, built on the Isherwood system, and carry about 7,700 tons deadweight.

MARINE ENGINEERS' B.O.T. CERTIFICATES.

To the Editor of THE MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—The discussion in your correspondence column criticising the new Board of Trade regulations for marine engineers' certificates has a particular interest for me, because I happen to be a "foreigner" who has taken the trouble to qualify and pass the examination for the highest certificate granted by the Board of Trade. I did this because I knew how high was the reputation of the "British marine" engineer in all foreign countries, and especially in my own country, and I felt that if I obtained the highest British certificate I would have some right to share in that regulation. But if the new regulations are to be allowed to come into force I am afraid that all my trouble will have been for nothing, for in my opinion they will certainly lower the standing of marine engineers. What other effect can they have, since they seem to be based on the idea that a period of 4½ months or less spent at a technical school is sufficient to give a marine engineer all the technical training necessary to qualify him for his certificate? To engineers to whom like myself time at a technical school has been a matter of years, the idea that a few months is all that is necessary is an insult.

As a "foreigner," I have always thought that this was the country where "freedom flourished," but the Board of Trade evidently intend that it shall not flourish for marine engineers. If it did they would be allowed to pursue their technical training as best suited their own convenience and circumstances, and provided they proved by passing the examinations that they had the necessary technical knowledge required by the Board of Trade, surely engineers should be allowed their freedom. But as only a few schools (two at present, I believe) are approved by the Board, engineers have no freedom of choice in the matter.

For my own sake, as the holder of a British certificate, I hope that these new regulations will not be allowed to come into force, and as I will suffer only because of the lowering of British prestige, I think all marine engineers should join in protesting against them.—Yours faithfully,

"A FOREIGN SUPERINTENDENT WITH A BRITISH CERTIFICATE."

Dec. 15, 1913.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—I am glad to see that your article on "Engineers' Scholastic and Practical Experience" has resulted in as many engineers expressing their disapproval of the contemplated alterations in the Board of Trade regulations for the examination of engineers. I think we all admit that a combination of theory and practice is very desirable, but, that theoretical training *in any degree*, may be accepted by the examiners in lieu of practical experience is most undesirable, and I consider it would be detrimental to the interests of owners, engineers and the travelling public. Undoubtedly the time is ripe for the Board of Trade to raise the standard of the engineers' examinations, and I would suggest alterations on the following lines, which are mainly in the interest of "Public Safety," but at the same time include a proviso for Theoretical training.

A candidate for a *second-class* certificate must be not less than twenty-three years of age. He must have served as an apprentice engineer and have been employed on the making or repairing of steam engines, boilers, etc. in the fitting and, or, erecting shops for at least four years. He must produce certificates of the Science and Art Department, South Kensington, or other recognised body to show he has passed the *Elementary* stage in the following subjects (here the Board of Trade could insert what subjects they require). In addition he must have served eighteen months at sea as engineer on regular watch on the main engines or boilers of a foreign-going steamer, etc., etc. (of this time at least six months should be on watch in the engine room and six months in stokehold). A candidate for a *first-class* certificate must be not less than twenty-five years of age. In addition to his apprenticeship, he must produce certificates of the Science and Art Department, or other recognised body, to show he has passed the *Advanced* stage in the following selected subjects. He must have served at sea for eighteen months with a *second class* certificate as senior engineer in charge of a watch, etc. of a foreign-going steamer of not less than 99 n.h.p.

As regards "Apprenticeship," I consider every boy should serve to the age of twenty-one years, which is the usual period, so that if he commences at fifteen he has two years for the drawing office and, or, theoretical training, but I maintain that four years in the fitting and erecting shops is the minimum time that should be recognised for practical work, independently of his sea-going experience.

Why cannot the Board of Trade raise their standard so that it is more nearly on a par with the requirements of the Insurance underwriters, and therefore of the shipowners? Imagine the "*Olympic*" or "*Mauretania*" going to sea with a chief engineer, age twenty-two years, holding first-class Board of Trade certificate, having served four years in a Locomotive shop and been twelve months at sea on watch in the stokehold of a liner and twelve months (with a second Engineers' certificate) as third engineer on a Baltic trader! Again the second engineer, age twenty-one years, holding second-class certificate, may have served four years in one of those shops that sometimes have a steam engine to repair and been at sea for twelve months as junior engineer on regular watch. As for the other engineers, no certificate, or for that matter no experience is required, yet such a staff would meet the present requirements of the Board of Trade.

On the subject of theoretical training I am opposed to the Board of Trade "approved" school's scheme. It may be presumed that the Board of Trade require "results;" if so, let apprentices and engineers get their theoretical knowledge where it suits them best; so long as they pass the necessary examinations, what does it matter? It would, of course, be necessary to hold examinations at frequent intervals, as it would be unreasonable to expect sea-going engineers to wait for the science examinations in May. No doubt this could be arranged and the Board of Trade examination rooms could be utilized for the purpose if necessary. Again while the Regulations are being revised, why not provide for a third-class or preliminary certificate, which should be held before a man is permitted to have *charge* of a watch, whether on a tug, trawler, coaster or foreign-going steamer,—a written or *viva voce* examination on the safe handling and maintenance of engines and boilers being all that is necessary and without any calculations.

Then there is the bugbear of nominal horse power; it would be so easy to use the "boiler" horse power and infinitely better. Why not?

However, the main point is that our sea-going experience is the "all-important," and no amount of theory or technical school training, whether "Approved" or not can rightly be substituted.—Yours faithfully,

"CHIEF" (at sea).

Antwerp, December 18th, 1913.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—With reference to the new Board of Trade regulations, as a young marine engineer holding a Board of Trade certificate, I should like to express my support of your several other correspondents in deprecating the principle of optional substitution of school training for sea service. It appears to me that there can be only one way of becoming proficient in this kind of work. It is true that the new rules provide an extension of time which covers the period for school training, but is not this extension necessary in view of the increase of responsibility due to the greater amount of machinery, in modern ships, under the care of the engineer on watch? Before going to sea I myself spent three years in technical schools, and while fully appreciating the value of the knowledge to be gained in such, I consider this kind of tuition should not in any way be permitted in lieu of watch-keeping at sea. Would it not be better to recognise the time, often amounting to twelve or eighteen months, spent by many juniors on refrigerating plants, where a young man is constantly coming into contact with the engine-room and is able to acquire much practical knowledge?—I am, sir, yours truly,

H. M.

Ealing, W., Dec. 15, 1913.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Dear Sir,—It is with great surprise and regret I have read the recent controversy in your paper regarding the proposed alterations as to the time of service requirements for Board

of Trade certificates. In recent years the machinery contained in the engine-room of a steamer has advanced so much that it is most necessary to make some alteration of importance in the qualifying time as regards sea service. How time spent in a technical school, studying theory, is to adequately balance a part of the proposed increase of sea service, and benefit the safe working of the machinery controlled by engineers, is beyond my comprehension ; also it is beyond that of other engineers with whom I have discussed the subject. In the case of accident it is only actual engine-room experience which can give young beginners the control of nerve and quickness of thought required for the safety of the travelling public and crew, in any emergency that may occur.

If more theoretical knowledge is required, then let the Board of Trade advance their questions to meet such requirements, but do not allow this to usurp the practical experience so necessary. In the alteration with regard to the gaining of theoretical knowledge proposed by the Board of Trade, which for some reason or other seems to favour certain schools, the engineers should be and are the best judges of where such knowledge can be obtained, and their prerogative should be respected.—I am, sir, etc.,

A JUNIOR ENGINEER.

Devon, Jan. 13, 1914.

(Correspondence continued on page 286).

FOREIGN NOTES.

Argentine Republic.

THE Argentine Republic has placed an order for four destroyers, each of 1250 tons displacement and to have a speed of 32 knots, with the Germania shipyard at Kiel. They are to be equipped with turbines of 30,000 i.h.p., the boilers to be served with oil fuel. Diesel motors are also to be installed.

Austria.

The *Balaton,* a destroyer of 800 tons, built at Fiume, attained on its trial runs the contract speed of 32.5 knots. Its turbines developed 17,000 i.h.p., oil fuel being used. Four further vessels of similar type are in course of construction.

Bulgaria.

It is reported that the port of Portalagos is to be extended and put into an efficient condition, and that four destroyers of 400 tons, twelve torpedo boats of 200 tons, one tender and one monitor are to be built.

Brazil.

The Brazilian authorities have decided to build another battleship to replace the *Rio de Janeiro,* sold to Turkey. The plans for this new vessel are being prepared and in the near future tenders will be invited.

China.

Orders have been placed with an Austrian shipyard near Triest for three armoured cruisers, and twelve destroyers with the Triest shipyard, six destroyers with the Vulcan shipyard at Stettin, two gunboats and five river gunboats with the Kiangnan Dock and Eng. Co. at Shanghai. It is reported that further orders are to be issued shortly.

Denmark.

The Danish Government has now placed an order for a battleship for the defence of the coast, which is to be named *Nils Juel.* It is reported that considerable additions to the fleet will be very shortly announced.

France.

The motor vessel, *Motricine,* has been successfully launched at the Chantiers de Normandie, where she has been built to the order of a Havre Shipping Co. Her length is 107m., beam 14m,, and moulded depth 8.5m. The hull is constructed on the longitudinal system. Two petrol motors are to be installed, each of 1,000 i.h.p. They are 4-cycle single acting and have six cylinders. The *Motricine* is to be used for the transport of petroleum. The Chantiers de Normandie have also three large cargo steamers in course of construction, each of 16,000 tons.

Germany.

The turbine steamer, *Admiral von Tirpitz,* built to the order of the Hamburg American Co., has been successfully launched at the Vulcan shipyard at Stettin. The vessel is of 20,000 gross tonnage, and has a length of 188m. and a beam of 23 m. Her engines will develop 8000 i.h.p. She has been built for the Panama service, but in the meantime she is to be employed on voyages to South America. The Bremen Vulcan has received an order for three cargo steamers of 12,000 tons from the North German Lloyd for the East Indian Service. The Oldenburg-Portuguese Steamship Company has also placed an order for a cargo steamer of 3,700 tons carrying capacity on a draught of 5.87m., the vessel to have a speed of 10 knots. The passenger steamer, *Hof,* owned by the German Australian S.S. Co., Hamburg, has been launched at the Neptune shipyard at Rostock. Her length is 122m., carrying capacity 7,800 tons, and her propelling machinery will develop 3000 i.h.p.

The cargo and passenger steamer, *Columbus,* has just been launched at the shipyard of Schichau at Dantzig where she has been built to the order of the North German Lloyd at Bremen. Her dimensions are, length 236m., greatest beam 25.3m., and on a draught of 10.36m. she has a displacement of 41,800 tons. The *Columbus* has accommodation for 536 first class, 444 second class, and 1110 third class passengers. Passenger accommodation is fitted up with all modern requisites. There is ample boat space for all on board. She is also equipped with wireless and submarine signalling apparatus, searchlights, and a complete electric installation for light and power purposes. The two triple expansion engines develop 30,000 i.h.p., and will give the vessel a speed of 20 knots. The *Columbus* is destined for the service between Bremerhaven and New York.

The motor tank vessel *Wilhelm A. Riedemann* (carrying capacity 15,000 tons), has been launched at Kiel for the German American Petroleum Co., Hamburg. The cargo steamer, *Andromeda,* of 4600 tons, built at the Oder yard at Stettin for the Argo Steamship Co., at Bremen, has just been successfully put through the trial runs when she exceeded the contract speed, the engines developing 1800 i.h.p. The cargo steamer, *Pfalz,* has successfully undergone her speed trials. She was built at the Bremen Vulcan shipyard at Vegesack for the North German Lloyd at Bremen. Length 149.35m., beam 17.98m., and carrying capacity 11,000 tons on a draught of 8.15m. Her engine developed 4,500 i.h.p., and gave the vessel a speed of 12.5 knots. The *Pfalz* is destined for the Australian service. The cargo steamers, *Ekkehard, Eberhard* and *Erhard,* have been sold by the German Shipping Co. at Hamburg to a shipping firm in Belgium for the price of £45,000 each. The cargo steamer, *Baden,* of 148m. length, 17.7m. beam, and 12,400 tons carrying capacity on 8.2m. draught, has been launched at the Vulcan shipyard at Bremen, where she has been built to the order of the Hamburg American Co.

The German Hansa S.S. Co's. cargo steamer, *Frankenfels,* has been launched at the Weser shipyard, Bremen. Her length is 128m., beam 17m., and her carrying capacity 9,000 tons.

The North German Lloyd saloon paddle steamer, *Lloyd,* built at the Nüske shipyard at Stettin has been launched; her propelling machinery will develop 700 i.h.p., and her speed will be 12 knots. She will be stationed at Cherbourg, and act as a tender to the liners of the Company.

The cargo steamer, *Luxor,* has been successfully put through her trial runs and attained a speed of 14.4 knots, her engines developing 3,000 i.h.p. Her length is 149m., beam 18.5m., and carrying capacity 12,5000 tons. She was built at the Tecklenborg shipyard at Geestemünde for the Kosmos Steamship Co., Hamburg, and will be employed in the South American trade.

The motor steamer, *Meppen,* of 6000 tons has gone through her trial runs successfully. She was built at the Seebeck shipyard at Geestemünde for the German American Petr. Co., Hamburg. The *Meppen* is built on the longitudinal frame system.

The motor vessel, *Arthur von Gwinner,* has accomplished speed trials successfully. Her carrying capacity is

4,200 tons, and the Diesel Motors of the Junkers system, will develop 1,900 i.h.p. She has been built at the Frerichs shipyard at Einswarden for the German Amer. Petr. Co., at Hamburg.

Holland.

The Royal Commission appointed to make suggestions regarding the defence of the Dutch Indies has now submitted its report and suggests the creation of a fleet of eight battleships, each of 21,000 tons, the vessels to be built in the course of 20 years, further, four torpedo cruisers of 1200 tons, eight destroyers of 500 tons, eight submarines of 380 tons, and eight torpedo boats of 300 tons, and at least two mine layers.

Italy.

The Admiralty intends to submit a new fleet programme to Parliament which provides for the construction of twelve Super-Dreadnoughts by the year 1918. These large battleships are to be equipped with eight to ten 38 cm. guns, and twelve to fourteen 19 cm. guns.

Comm. Vittorio Emanuele Cuniberti, Major General of the Italian Naval Engineering staff, died suddenly at his home in Rome on the 20th December. The deceased officer, who was born in Turin in 1854, had had a distinguished career and was well known in naval circles in several countries.

Portugal.

The plan for the increase of the fleet includes the following :—(1st) Three battleships, three cruisers, three large destroyers and three smaller ones. (2nd) For coast defence—six large destroyers, six submarines. (3rd) Auxiliary war vessels. (4th) Warships for the defence of the colonies. Further details regarding the time of building may be expected shortly. It is rumoured that English firms will probably get orders for four of the above vessels. The laying down of a dockyard suitable for the aforesaid ships is also being considered.

Roumania.

The fleet programme of the Admiralty provides for the following ships :—For the Black Sea—Six small cruisers of 3500 tons, and twelve destroyers of 1500 tons. For the Danube—Twelve Monitors of 600 tons, and a large number of smaller craft. The port of Mangalia is being fitted up as a State Dockyard and Arsenal.

MARINE MOTOR NOTES.

WITH the advent of cold weather and the possibility of frost, trouble is frequently found in starting up with engines running intermittently. The petrol starter is a handy accessory to the paraffin engine, and the practice of injecting a small quantity of paraffin into the cylinders after shutting down is of service in preventing the lubricating oil congealing on the walls, and often sufficient vapour remains for starting purposes. The accumulators may be used for warming the carburetter, as only a small current is necessary, although a small blow lamp is a popular method where the ignition is obtained by magneto. There are carburetters on the market having electric heaters for cold weather starting and also some with bye-pass jets for this purpose. The references made in the report of that excellent society, whose aim is to assist the seafarer in times of storm and stress along the coast line, in regard to the value of the motor-lifeboat, is both satisfactory to the seagoing community at large and welcome to those firms who have been entrusted with the building of these craft. When one bears in mind the strenuous endeavour often necessary in reaching a wreck under heavy weather conditions, it is realized that the motor must greatly enhance the value of the lifeboat, both by increasing the certainty of sending help and by reserving the strength and energy of the crew for the most necessary purpose. It is further gratifying to the public, who so generously support the society, to know that those responsible for the conduct of affairs are alive to the benefits to be derived from the use of the motor, and incidentally recall to mind the fact that the crew is engaged in a hazardous occupation, the glamour of which is not all-sustaining. The motor-boat is finding a useful sphere of action for pilot service in preceding large vessels entering harbour, and, when mooring in the stream, or warping to the quay side, greatly accelerates the carrying of cables to the buoys and capstans. That the fleet of Scottish motor-coasters is being added to is sufficient evidence of success, and Messrs. Jeffreys on the Forth, and Messrs. Beardmore on the Clyde, are to be congratulated on having booked fresh orders conjointly. The company for running motor barges on the Thames has at length been formulated, and their enterprise has every prospect of being crowned with success. The number of vessels now in the water and others also nearing the completion stage is sufficiently large to make an interesting addition to the motor fleets, and there is apparently no slackening in the industry as far as the smaller craft are concerned, while the works building the larger types of engines have their hands fairly full of orders, although these are mainly for services where special conditions apply which make the oil-engine a suitable means of propulsion. Two vessels recently launched on the Tay, and others on the stocks on the Clyde and Forth, together with the three vessels for the East Asiatic Company to be converted from steam to oil motors on the Clyde, and formerly referred to, will give an impetus to the industry during the course of the year, the advantage in favour of the West Coast being the manufacture of the machinery locally. The Board of Trade enquiry into the loss of the motor-ship *Scout*, owned by Messrs. D. MacBrayne, Glasgow, may well direct attention to the risk of fire on board craft using oil fuel, and particularly paraffin or petrol. A fire broke out on board this vessel in the engine-room and completely gutted the ship, which, fortunately, was in a position to be beached and so land the passengers and crew. At the enquiry the reason assigned for the outbreak was that the flywheel collected oil from the bilges and splashed it upon the red-hot exhaust pipe, causing a flame to be projected, which ignited the oil that had apparently leaked into the bilges and had not been discharged overboard, due to the deficiency in pumps. Fire extinguishers, sand and buckets of water were ineffectually used, and the fire eventually spread beyond control. In giving evidence the chief engineer mentioned his non-acquaintance with the Board of Trade instructions issued in 1909 and 1913 with reference to the precautions to be taken against fire,—a matter which we are afraid is only too general, and although these are quite readily obtainable as white papers, they are not so widely distributed as apparently is desirable.

LLOYD'S REGISTER OF SHIPPING.

APPOINTMENT OF NEW CHIEF SHIP SURVEYOR.

THE General Committee of Lloyd's Register announced on January 8th that they had appointed Mr. Westcott S. Abell, Professor of Naval Architecture at Liverpool University, to succeed the late Dr. S. J. P. Thearle in the office of Chief Ship Surveyor to the Society. The selection has fallen upon one whose scientific training and attainments, which he possesses in a remarkable degree, admirably befit him for the position. Born in 1877, the subject of this note passed his early school-days in Devon, where he obtained Second-class Honours, Cambridge Local, and other awards and later entered the Royal Naval Engineering College, Devonport in 1892, as an engineering cadet. At the end of his second year he passed first student and was given a studentship in naval architecture. Being then transferred to Devonport Dockyard, he for three years received practical training and attended all lectures. In 1897, he qualified for admission to the Royal Naval College, Greenwich, for further training as probationary assistant constructor, completing the course in June, 1900, when he was awarded a first-class professional certificate with 80 per cent. of the total marks. He re-entered Devonport Dockyard, and for twelve months was engaged upon practical ship design and building. Returning then to Greenwich, for seven years, Prof. Abell was engaged in the Admiralty designing office, and as instructor in the Royal Naval College. During this time he was employed upon work in connection with the performance of subsidised merchant steamers and upon battleship and destroyer design. During the years 1904 to 1907 he served as professional secretary to Sir Philip Watts, K.C.B., late Director of Naval Construction. In 1908, Prof. Abell read a valuable paper on "Ship Calculations" before the Inst. of Naval Architects. The study of the stability of

Lloyd's Register. The Chief Ship Surveyor.

W. S. Abell

Principal of Chief Ship Surveyor's Staff.

C. Buchanan.

ships and their behaviour under varying conditions at sea has been a matter of continuous study and research, many valuable contributions having been made to the subject by him. In November, 1909, he was appointed to the Alexander Elder Chair of Naval Architecture at Liverpool University, and the courses of instruction evolved during the first nine months have not required any departure from during the four years of his Professorship. In recognition of the valuable papers read and the continuous study of the structural strength and watertight subdivision of ships, the Board of Trade, in April, 1913, appointed Prof. Abell a member of the Load Line Committee, who were instructed to prepare a basis of agreement for international discussion. Apart from his other duties, Prof. Abell has been acting Chairman of the Faculty of Engineering, member of the University Council, member of the Finance Committee of the Council, and member of the Council of the Liverpool Engineering Society.

MR. CHARLES BUCHANAN, for whom the office of Principal of the Chief Ship Surveyor's staff has been created, is one of the best known and most popular naval architects of the day. He has been associated with mercantile shipbuilding throughout his career. Prior to joining the service of Lloyd's Register in 1880, he held the position of chief draughtsman with the well-known firm of Messrs. A. McMillan & Sons. Later he enjoyed a varied experience of his profession at various shipbuilding ports in the country. Since 1891, he has been stationed in London, holding for the last seven years the position of assistant to the chief ship surveyor. For many years past he has been associated particularly with the duty of dealing with plans of vessels submitted for the Committee's approval, and this work has given him probably unique knowledge of all the latest developments of shipbuilding practice throughout the world. Mr. Buchanan has lately been appointed by the Board of Trade to be a member of the Departmental Committee on Bulkheads and Water-tight Compartments in ships.

A report comes to hand of a disastrous explosion which occurred on the Cunard Co.'s *Mauretania* while in dock in Liverpool on the 26th of January. It is stated to have been caused by the bursting of a metal cylinder containing compressed gas used by the men in the work of brazing turbine blades. Three workmen are reported killed and eight injured.

"TITANIC" FUND.—INSTITUTE OF MARINE ENGINEERS.—We are informed that the *Titanic* Engineering Staff Memorial Fund in connection with the Institute of Marine Engineers now amounts to £2,640, exclusive of the £300 granted to the Southampton Memorial Committee. After deducting the amount required to place a memorial in the new premises of the Institute, it is intended to invest the balance as a capital account, the interest of which will be utilized for the benefit of orphans of members of the engineering staff of any steamers, who may require help. As a preliminary to this, an agreement has been entered into with the Merchant Seamen's Orphanage, Snaresbrook, under which, by an annual payment, the Institute shall have the privilege of selecting and nominating an eligible orphan child each year. It is proposed that the fund be not closed, but be considered as an established benevolent fund, to which contributions are invited from members and others interested.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Resumption of Work.—Resumption of work after the New Year holidays in the Clyde and other districts of Scotland, and generally speaking in all branches of industry connected with shipbuilding and marine engineering, was on the whole very satisfactory. The holiday period was extended in a good many instances beyond what is usual, and good wages, conjoined to good weather, contributed to a relaxation from labour which has told in respect of steady return to work, although the visitation of fog on Clydeside was very severe for the better part of a week about mid-January. An interest—sentimental at least—always attaches to the first launch of the year on the Clyde. On this occasion three firms may fairly lay claim to the distinction which the initial launch of the year confers. Messrs. Ritchie, Graham and Milne, Scotstoun; Messrs. John Fullerton & Co., Paisley, and Scott's Shipbuilding and Engineering Co., Greenock, all made a first contribution by the same tide to the output for 1914. While the vessels sent off by the two firms first named were small, the production of the Greenock firm was of considerable size, and appropriately enough for a shipping concern which has now a big stake in the shipping industry of the Clyde. The vessel was the steamer *Agapenor* of 7,550 tons gross, and 470 ft. in length built to the order of Messrs. Alfred Holt & Co., Liverpool. She is a sister ship to the *Helenus*, launched by the Scott firm in October last year, and like her is intended for passenger and cargo service to the East. The vessels of the Holt line, it may be added, are amongst the very largest and most regular traders to and from Glasgow, so, as above indicated, it is only in keeping that an addition to this well-known fleet should have the distinction of being the first of the year to enter her native element.

New Contracts.—During what has passed of January very few orders indeed have been received by Clyde shipbuilders, although as will be seen further on, the Caledon Shipbuilding and Engineering Co., Dundee, have received their "record" shipbuilding order in the shape of a 10,000-ton deadweight carrier, which when completed, will be the largest ever constructed on the Tay. This vessel is for Messrs. Alfred Holt, and Co., Liverpool, who have at present under construction on the Clyde and elsewhere vessels of the same tonnage.

Messrs. Archibald McMillan & Son, Dumbarton, have received a contract to build a steamer about 440 ft. in length designed for the carriage of chilled beef, but for which shipowning concern has not been stated. Four steamers of about 500 ft. in length, intended also for chilled beef carrying between the Argentine and New York, have been ordered from Messrs. Harland & Wolff, and probably a share of this order will be allocated to the establishment of this firm on the Clyde. So far, nothing has yet definitely justified the rumour which has been circulating among Clyde as well as North-East Coast shipbuilders that a large Liverpool shipping company—said to be Messrs. Elder, Dempster & Co.,—are in the market for no fewer than twelve high-class cargo liners.

Messrs. Drysdale & Co., Ltd., Bon-Accord Engineering Works, Yoker, have had a very busy year in all branches of their business, while for the year just begun they have already secured a large number of orders for all types of centrifugal pumping machinery, land as well as marine. In the marine auxiliary department there has been a record output for all classes of circulating pumps required on board both mercantile and war vessels for home and foreign ownership, besides a large number of electrically-driven sanitary and bilge pumps for passenger vessels. A number of high-duty electrically-driven turbine and centrifugal pumps have been produced for the colonies in connection with water supply and sewerage disposal. For city water supply the firm find that the electrically-driven centrifugal pump is gaining much favour in the eyes of engineers on account of its low first cost and running charges, and from the inexpensive nature of foundations required compared with the reciprocating high-duty pumping engine. For condensing in power stations, both at home and abroad a large number of electrically-driven pump plants have been supplied. The firm has also developed a special high speed centrifugal pump to work in conjunction with turbine-driven rotary air pump installations. An increased number of electric generating sets, direct coupled to totally enclosed forced-lubrication engines, have been made during the year, and it is found that this type of engine is greatly in demand for main circulating pumping engines for marine work. During the year the firm has completed a number of pumping installations for floating and dry docks, while they have at present on hand and partly installed several very large equipments of their pumps at important docks.

Messrs. John Hastie & Co., Ltd., Greenock—from information gathered just too late for our notes in January issue—were kept exceedingly well employed throughout 1913 in the production of steam and electric steering gears. The principal feature of the year's output was the large proportion of steering gears supplied to large passenger and mail steamers, built both in this country and abroad. They also supplied a large number of electrical steering gears on the "Hele-Shaw Martineau" principle, and have at present in hand a number of orders for this type of steering gear for warships building for the British and foreign navies. The prospects for the year now entered upon are good, and full employment is already ensured for the next twelve months.

The Greenock Harbour Trust, with the view of extending the harbour and James Watt dock facilities, are now seriously taking up a scheme of improvements; one of the features being a crane of 150 tons capacity, to be erected at the Watt Dock for the fitting-out of new steamers. The general managership of the Trust, which has been vacant for some time, is likely soon to be filled up. Applications from forty-three individuals have at the time of writing been reduced to a leet of five, none of these being local applicants.

Messrs. the Caledon Shipbuilding and Engineering Co., Dundee, who built and engined last year two twin-screw steamers of about 3,500 tons gross, and 2,000 i.h.p., also a steamer of as much as 6,320 tons gross and 2,730 i.h.p., are about to improve on these dimensions and power in the contracts now on hand. But for the fact of the inadequacy of the lifting and docking facilities in Dundee—shortcomings which have persistently been commented on by this and other Dundee firms, the average length and tonnage of the vessels produced at the port would long ago have been greater. In addition to the 6,330-ton steamer launched about the latter end of last year and now fitting out, the firm have on the stocks four vessels, the largest of which is 5,300 tons gross. Early in January the firm received an order from Messrs. Alfred Holt & Co., Liverpool, for a steamer which, when completed, will be the largest ever constructed on the Tay. The vessel will be 470 ft. long, 56 ft. 4 in. broad, and 35 ft. 3 in. deep, with a deadweight carrying capacity of 10,000 tons.

"Boiler Shop Plant" was the title of an interesting paper read by Mr. John C. Wylie before the Glasgow and West of Scotland Association of Foremen and Draughtsmen at a recent meeting held in the Institution Rooms, Elmbank Crescent, Glasgow, Mr. Charles Scott presiding. The paper gave briefly a comparison of different types of equipment for the power-house, with the relative cost of the installations. The various machines and plant utilized in different stages of boiler construction were dealt with and comparisons made between alternative methods. The extended use of the oxy-acetylene processes of welding and cutting was advocated for work in which structural strength was not a primary consideration. Air-compressing machinery and pneumatic tools were also considered in their relation to boiler work. The paper was illustrated by slides showing typical machines by a number of leading machine tool makers.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, continue to be very busy, and are reported to have secured the order to build a cargo and passenger steamer

for Messrs. Furness, Withy & Co.'s Canadian trade to Messrs. John Esplens & Sons, Liverpool, specification; the vessel will be about 420 ft. long, 14 knots speed. The 500 ft. steamer for the Federal Steam Navigation Co. will be fitted with geared turbines in place of twin-screw triple-expansion engines, as originally intended.

Messrs. Smith's Dry Dock Co., South Bank, continue to have a large amount of tonnage, repairing, docking, etc., including the s.s. *Umona* and *Peter Benort* undergoing extensive repair.

Messrs. W. Harkess & Sons, Ltd.—Nothing new is reported during the month but they are likely to secure the order to build a small coaster for Liverpool owners.

Messrs. Richardsons, Westgarth & Co., Ltd., have a fair amount of marine work on hand. They have secured the order for the large boilers to be fitted to the Federal Line geared turbine twin-screw steamer to be built by Messrs. Dixon. These boilers will contain about 15,000 ft. of heating surface and will be fitted with Messrs. J. Howden & Sons' forced draught system. They have sufficient boiler work on hand to keep them busy for about nine months.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. continue to be very busy. The steamer to be built for Messrs. W. & C. T. Jones, Cardiff, will have a deadweight capacity of about 7,000 tons.

Messrs. Craig, Taylor & Co. have sufficient work on hand to keep them well employed for a long time yet. Nothing new is, however, reported during the month, but they are likely to secure the order to build a medium-sized cargo steamer that is on the market.

Messrs. R. Ropner & Son report nothing new during the month. They, however, have a large amount of work on hand which will keep them busy for some time.

Messrs. Blair & Co. have secured most of the contracts to supply the machinery for steamers to be built at the port and on the Wear. This is expected to keep them busy throughout the year.

West Hartlepool.

Messrs. Furness, Withy & Co. are reported as having placed orders for two additional steamers for their Canadian trade, one with Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, and one with the Northumberland Shipbuilding Co., Howdon-on-Tyne. They have also sold the *Cleveland Range* (Neptune Steam Navigation Co.), a vessel of 3,542 gross tons, to Gavarone Fratelli, Gênes, who have renamed her *Guiseppe G.*

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Harbour Dockyard.—Although nothing new is reported during the month, they have orders on hand to replace the steamers now building on all their berths.

Messrs. W. Gray & Co., Ltd., have sufficient work to carry them right through the year. Preparations will shortly be made for the building of the largest size steamer on their new site on the Tees.

Messrs. The Central Marine Engine Works of Messrs. W. Gray & Co., continue to be as busy as ever, having a large amount of work on hand. They have secured the orders for the machinery for all the steamers to be built by this firm. Great extensions may be required to cope with the large amount of work on hand, especially stamping and their specialities.

Hartlepool.

T. Peveril, Esq., has sold the steam trawler s.s. *Ostrick*, 148 gross tons, to F. W. Mayson, Esq., also of Hartlepool.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Middleton Yard, have secured the contract to build two medium-sized cargo steamers of about 7,000 tons deadweight for Messrs. Furness, Withy & Co. for early delivery. They also have a large amount of dry dock work on hand.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy. Alterations are being made to cope with geared turbine work as an extension of their land work. They have also secured the order to supply the engines and boilers for the steamer to be built by Messrs. Irvine's Shipbuilding & Dry Dock Co. to Messrs. Furness, Withy and Co.'s order. They have plenty of work in the condensing plant, electrical and turbine departments.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Commander Cowlrick, R.N.R.—By the death of Commander Cowlrick, R.N.R., at his residence, the "Lodge," Kirkella, near Hull, after a few weeks' illness, Hull has lost a prominent personality and the Wilson Line a conscientious and faithful officer. For little over a year Captain Cowlrick had held the appointment of marine superintendent, and at the comparatively early age of fifty-three his career, which had been brilliantly successful, has been closed. Captain Cowlrick was perhaps more widely known as the captain of the R.M.S. *Eskimo*, which was his last command in the fleet. With the characteristic briefness and keenness of a son of the sea he combined a warm geniality, and was a great favourite with tourists to the Norwegian Fjords. His death will be mourned by a very wide circle, and his loss will be keenly felt by the firm to which he gave so many years of devoted service. By his death the young cadets at the *Eldorado* training school have lost a friend, and one who was deeply interested in their welfare. The body was shipped on 24th January on board the R.M.S. *Salino* for Christiania, Norway, for interment. His wife is a Norwegian lady.

Mr. Wm. North, engineer.—The death occurred at Walsall on the 31st December, while on a visit to his daughter, of Mr. North, who had been employed by the Hull Corporation as superintendent of the sewage pumping department for about thirty years. Previous to joining the Hull Corporation, he sailed for a number of years as chief engineer in the Wilson Line in the Atlantic and Mediterranean trades. He was well known among the marine engineers of the port. The burial took place at the General Cemetery, Hull, a large number of friends attending.

Hull Marine Engineers.—To inaugurate the re-opening of the Marine Engineers' Institute after alterations and the installation of electric light, the members of the Humber District Branch of the Marine Engineers' Association held a smoking concert at the rooms in Dock Street, when a varied and excellent musical programme was greatly appreciated by the large company of engineers and friends present. The recent alterations have greatly improved the rooms. In the local secretary, Mr. Shepherd, the engineers of the Humber district have a willing and efficient worker.

Goole.—At the time of writing there are twenty-one steamers belonging to the Lancashire and Yorkshire Railway Co. in the docks, which have been moored now for over four weeks. The captains and officers are abstaining from duty until they have the promise of more wages and the Company agrees to supply them with provisions whilst away from Goole. All hands have been paid off with the exception of a few engineers, who are busy opening out for surveys, etc., the Company taking advantage of the steamers being idle to have this work done.

Hull Shipping.—The trade of the port as regards tonnage has been good. The Wilson Line are having a large 10,000-tonner for the Atlantic trade fitted out on the Clyde, built by Russell & Co., Port Glasgow; several holds are insulated for carrying perishable cargoes, and she will be equipped with guns for protection on the high seas. The locally owned steamer *Sampan*, belonging to the Denaby Main Colliery Co., Ltd., had a very narrow escape in the English Channel, being run into by a Spanish steamer during a fog and struck aft. This occurred during the relieving of watches, otherwise several men might have been killed in their bunks. She arrived in Hull badly damaged, and will have to undergo expensive repairs by Earle's Shipbuilding Co. before being able to go into commission again. The Hull trawler *Bassano* has been very fortunate in towing a 6,000-ton steamer into Christiansand, Norway.

Amos & Smith, Ltd., engineers and boilermakers, are busy in all their departments, building engines and boilers for trawlers, coasters, etc. Machines are running night and day to compete with the great amount of work in hand. Repair work on the different docks is also very brisk; the outside staff are kept well employed opening out boilers and engines for the different Board of Trade, British Corporation and Lloyd's surveys.

C. D. Holmes, Ltd., engineers and boilermakers, have a sufficient number of vessels in hand to keep them busy throughout the year, besides building powerful trawler winches, pumps,

etc., for trawlers. The outside staff at Alexandra Dock (branch) is kept well employed with repair work and opening out for surveys. They are also busy fitting the engines and boilers, etc., into trawlers in Queen's and Albert Docks.

Cooper & Co., Ltd., engineers and ship repairers.—Repair work with this firm just at the moment has not been so plentiful as in the past; the moulding shop is kept engaged with general castings and propellers for home and foreign export. The firm's own graving dock is busy with general repair work on coasters, tugs, etc.

Central Dry Dock, Ltd., have had a fair amount of work in hand during the month on the different docks, and have had to engage the public graving docks for different steamers during the month, the Company's own dock being in commission. The firm has several enquiries during the month for graving dock work, hence they expect a good run of repairs during February.

Stewart & Craig, engineers and ship repairers, have been engaged during January with repair work on different steamers, graving dock work and the usual opening-out of boilers and machinery. These works are well equipped to deal with repairs promptly.

Woodall & Co., engineers, have been fairly busy on the different docks, mostly among foreign steamers, opening-out, etc. The different departments are kept fully employed at the works; the smithy on forgings, such as stems and stern posts, for different small shipyards throughout the country.

The North-East Coast Engineering Works (Hull), Ltd., have had an exceedingly busy month on the following steamers —s.s.'s. *Alexandra, Dunrobin, Goetz, Chatton, Rochelle* and R.M.S.P. *Tamar*: s.s. *Alexandra*, very heavy extensive repairs, new deck and shell plates, new tail shaft, new tank tops, also heavy repairs in engine-room; s.s. *Rochelle*, heavy repairs to engines caused by racing; s.s.'s. *Dunrobin* and *Chatton* repairs on deck, and in bunkers, and usual engine-room repairs. S.s. *Goetz*, dry-docking, taking indents out of plates, etc.; R.M.S.P. *Tamar* usual engine and deck repairs. Several enquiries for graving dock work have been received.

Thomas Tate, Clarence Engine Works, has a number of small coasting steamers and tug boats undergoing repairs, and in some cases some very extensive repairs are being carried out on local steamers. This establishment seems to have a good future before it.

Cochrane & Sons, Ltd., shipbuilders, Selby, have just launched the largest trawler in the world for French owners. She is to be equipped for fishing on the banks of Newfoundland and will also have a Marconi installation for long distances. The boilers and machinery are built by the well-known firm, Amos & Smith, Ltd. The builders are well booked up to 1915 for building trawlers for Cork, Fleetwood and Boulogne.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Southampton.—In January considerable anxiety was occasioned locally by a report that the R.M.S.P. Co.'s *Cobequid* was ashore in the Bay of Fundy. The vessel had several passengers aboard, amongst them being Captain Hicks, the Company's marine superintendent and Mr. W. C. Kenny, the local director of the Company. The *Cobequid* is engaged in the Company's Canadian service, and was returning from Demerara with passengers and a large cargo of sugar. She encountered a severe blizzard, and was reported ashore at Briar Island. In response to urgent wireless calls for assistance several vessels proceeded to the spot, but could not locate the vessel, which was eventually found on Trinity Ledges. After considerable privations the passengers and crew were safely landed, and several are now on their way home. Some of the crew are remaining, but at the time of writing these notes it was understood that the vessel would become a total wreck.

Last month the remains of Mr. John Walls were interred in Southampton Cemetery. Mr. Walls was senior engineer of the American Line, and had completed nearly forty years' service with the old Inman Line and the American Line. His last ship was the *Philadelphia*, and he had crossed the Atlantic nearly 800 times. The funeral was very impressive and largely attended, Mr. P. E. Curry (manager) and Mr. F. J. Blake (superintendent engineer), and a large number of representatives of the local shipping companies attended the corpse to its resting place.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—This firm continue busy in all departments. They have three cargo boats in hand for the Royal Mail Co., which are intended to replace three boats engaged in trading in the West Indies Islands. The new vessels will be 110 ft. long with a beam of 21 ft. Compound condensing engines, having cylinders 15 in. and 30 in. diameter, with a stroke of 24 in., working at 120 lbs. pressure per square inch are being supplied by the builders. Other work in hand includes a coastguard cruiser and dock gates for the Admiralty. The s.y. *Savonara* is on the slip and undergoing extensive internal alterations. She will then fit out. The s.y. *Medusa* is also fitting out for a cruise in the Mediterranean.

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight.—The Chilian destroyers *Almirante Lynch* and *Almirante Condell* have been officially handed over, and will shortly proceed to Valparaiso. H.M.S. *Laurel*, the first of two torpedo-boat destroyers built under the 1912-13 programme, has completed her trials, and a sister vessel, H.M.S. *Liberty* is receiving her machinery. Sundry small steam and motor vessels have been delivered during the past month, and the engine works have several large sets of Diesel engines in hand.

Messrs. John I. Thornycroft & Co., Ltd., Southampton.—Work is progressing on H.M. torpedo-boat destroyers *Porpoise, Unity, Victor, Lance, Lookout, Meteor* and *Mastiff*. A further destroyer is due for delivery at the end of January, and another will be launched about the middle of February. The Canadian Customs cruiser *Margaret* was launched on January 14th, and a report of the vessel is given under our Launch section. Good progress i being made on the twin-screw tugs for the Argentine Navy, and motor boat work. Amongst the deliveries of general engineering orders during the month have been several for Thornycroft oil-burning equipments, and other orders for similar gear and for Thornycroft water-tube boilers are well in hand. A very considerable amount of repair work has been carried out during the month, among which may be mentioned the rapid repair to the rudder of the *Balmoral Castle*. The rudder-plate and two arms were found to be bent, and it was decided to remove the rudder complete with the arms, a weight of 20 tons. Great difficulty was experienced in removing the coupling bolts, six of which in fact had to be drilled out. The rudder was then disconnected and pulled out from under the counter by the aid of the usual crane and block tackle, and then transferred to Messrs. Thornycroft's works. It was first proposed to heat the rudder with the arms on, pressing out straight under the hydraulic press, but on further consideration it was decided to remove all the arms and straighten the plate and the two bent arms independently to avoid any possibility of twisting the rudder post. This being completed the plate was re-riveted to the arms and the rudder refitted with the crane and block tackle. The whole job was completed in less than three days.

THAMES.

(From our Own Correspondent.)

A Shipping Combine.—Another of the movements in this way we have had to mention in recent years, has been that recently announced of the joining-up of Messrs. Milburn and Co., Tyser & Co. and T. B. Royden, of Liverpool, under the style of the Commonwealth Steam Navigation Co., with headquarters in London. The combined fleet will, it is said, number thirty-two vessels with a gross tonnage of 190,210. It will be noted that the vessels are engaged in the Australian trade and are fitted for carrying frozen meat, and some of them for emigrants.

Port of London Improvements.—Contracts have been placed by the Port Authority for the supply of three 1,000-kilowatt converters in connection with the power station at the Victoria and Royal Albert Docks, and the offer of the British Westinghouse Co. to provide them has been accepted. The contracts for three pairs of lock gates or bascule bridge, a swing bridge and a caisson have gone to Germany, there being a considerable saving over the lowest figures from

British firms. At the Surrey Docks large under-cover accommodation is to be provided at the Albion Dock for wood cargoes, where goods are now exposed to the weather. As much as £30,234 expenditure for this purpose has been resolved upon there.

New Training Ship on the Thames.—For the Royal Navy Volunteer Reserve the Port of London Authority has given permission for the mooring of a training ship off the Victoria Embankment below Temple Pier, and connection with the shore by a pontoon and gangway. The *President* is to be removed 40 ft. higher up the river.

The New St. Paul's Bridge.—The designs for the new structure for which the Bridge House Estates Committee of the Corporation is offering a premium of £300 as a first prize, will be prepared and submitted during the next few months; £200 and £100 are respectively the second and third premiums offered in the competition.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

MUCH interest is evinced in the approaching Royal visit to Birkenhead. Their Majesties are to pay a visit of inspection to the works of Messrs. Cammell, Laird & Co. on March 25th, when they will be shown through the extensive departments by Mr. L. Hitchens, chairman, and Mr. G. J. Carter, managing director.

Messrs. Cammell, Laird & Co.—On January 6th, the t.s.s. *Khiva*, the first of the four intermediate passenger and cargo vessels building for the P. & O. Company, was handed over to the owners. Owing to severe weather no further trial took place, the vessel leaving later the same day for Antwerp. Mr. C. G. Deane, N.A., and Mr. R. Leslie, superintendent engineer, Capt. G. C. Henning, marine superintendent, and Mr. J. T. Smith, resident engineer, were on board representing the owners. The train ferry for the Transcontinental Railway of Canada was successfully launched on January 17th, and is now in the wet basin receiving the rest of her machinery. Other important orders in hand include two large steamers for Messrs. Embiricos, two geared turbine steamers for South America, besides important Admiralty work. The repair department completed an extensive overhaul to the *Royal Edward* the first week in January, and the *Royal George* will shortly arrive for her annual refit. New rotors have lately been supplied for the *St. George*, recently acquired by the C.P.R. Co. These have been shipped to New York, engineers from Birkenhead having gone out to supervise their installing. At the end of 1913, Mr. John F. Lacon retired from the staff of Messrs. Cammell, Laird & Co., having for some time occupied the position of head of the engineering buying department. Mr. Lacon commenced his career in the private secretaries' office in the old house in Hamilton Square of the late Mr. John Laird, M.P. Later his duties were centred in the timber department, and he was associated with the building of H.M.S. *Seahorse*, the first all-steel vessel built for the Navy in a private yard. Mr. Lacon closed his connection with the firm after attending to all the contracts in connection with H.M.S. *Audacious*, and, prior to retiring, was made the recipient of a handsome presentation on behalf of the staff.

The Allan Line.—The well-known steamer *Parisian*, that has sailed under this flag for so many years, has been sold by Messrs. C. W. Kellock & Co., of Liverpool, to Italian owners for £12,000. She was built in 1881 by Messrs. R. Napier and Sons, of Glasgow. New triple-expansion engines, with cylinders 36 in., 90 in. and 98 in. diameter, and boilers were fitted by Messrs. Workman, Clark & Co., of Belfast, in 1899. The vessel's dimensions are:—Length 440 ft. 8 in., beam 46 ft. 2 in., and depth 25 ft. 2 in., with a gross registered tonnage of 5,395 tons. The new Allan liner *Alsatian* arrived in Liverpool on Dec. 20th, and docked in the Canada Tongue Dock the same day. Prior to her arrival, the *Alsatian* had completed a successful trial trip from the Clyde to the Longships, an average speed of nearly 20 knots being maintained. The liner sailed on her maiden trip on January 17th. This Company have decided to grant an increase in salary to all their ships' officers to date from January 1st.

The Canadian Northern Railway.—This Company, who operate the Royal Line of Steamers between Bristol and Canadian ports, are to establish a weekly service, and in order to do this contemplate buying two more steamers.

The Isle of Man Steam Packet Co.—Mr. Fred M. Lamothe, advocate of Ramsey, has been appointed to a seat on the Board of Directors to fill the vacancy caused by the death of Mr. J. G. Elliott. The Ramsey-Whitehaven service is to be continued this season.

The Training Ship "Indefatigable."—This fine specimen of the old "Wooden Walls" of England has now been replaced by H.M.S. *Phœton*. On January 6th tugs moved her from her moorings in the Sloyne to the West Float, Birkenhead. Built in 1846 at Devonport she was commissioned on the North American station, and, later, in 1864, was handed over to the Liverpool Sea Training Homes. The two-funnelled second-class cruiser *Phœton*, which took up her station at the same moorings on Jan. 15th, has been bought from the Admiralty by Mr. Frank Bibby. This vessel, which will carry the old name of *Indefatigable*, is 300 ft. between perpendiculars and 48 ft. beam, is fitted with electric light and Marconi apparatus, and has accommodation for 300 boys against 200 in the older vessel.

Colegrave's Boat-Lowering Gear.—On Dec. 22nd, a demonstration of the great utility of this gear was given to the shipping community on board the Cunard liner *Carmania*. On January 20th a further test was carried out on board the White Star Liner *Cymric* in the Canada Dock. This vessel now has a set of Colegrave's Gear fitted on each side. Sand bags being used to represent the weight of 48 persons, boats were placed in the water on either side in three minutes. The gear was next attached to an Englehart collapsible boat, which, together with a lifeboat, was placed in the water in about ten minutes. The Englehart boat was easily hoisted aboard by three men on each winch. Mr. Stephenson was present at the latter test on behalf of the Board of Trade. Mr. Anthony Armstrong, the local representative of the makers, Messrs. Bullivant & Co., superintended the very successful tests.

The Marine Engine Auto Control Company.—Great interest in local shipping circles has been aroused in the simple and efficient marine engine control now being placed upon the market by this company. Repeat orders have already been placed, its remarkable reliability and quick, positive action proving it to be a distinct and necessary adjunct to the manœuvring and navigating powers of a steam vessel. Commodious offices have been opened at Luscerne Buildings, 3, Red Cross Street, Liverpool. Mr. Robt. A. Sydney, who studied marine engineering and naval architecture under Prof. Sir John Biles at Glasgow University, and has had many years experience in the designing and fitting of all kinds of machinery for marine propulsion, has been recently appointed manager of the Company. The offices at the above address will be made the headquarters for the company's business in the United Kingdom.

The North Atlantic Lanes—In all probability an alteration to the Lanes followed by vessels across the North Atlantic may be recommended. In the recently-issued report of the Naval Hydrographic Office, Washington, a greater margin of safety is advocated beyond that laid down in the track agreement of 1898 successfully carried through by the late Mr. Ismay.

The Manchester Ship Canal.—More men are being engaged by the Partingdon Iron & Steel Co. at their new works at Irlam, another furnace having been lighted. Up to the present iron only has been manufactured from ore shipped through the canal. Rolling mills for steel are now to be put in operation, some 300 more men being required.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The shipbuilding trade of this district still occupies a brisk state, and there is uninterrupted activity shown in all departments of industry. There is, of course, a large amount of work in hand, and every branch of the concern of Messrs. Vickers, Ltd., is very full of work, and is likely to remain busy for a long time to come. No intimation of new orders in the shipbuilding department is to hand, and probably no such news will come to hand until

contracts are signed and agreements entered into, but it is known that the firm are in correspondence with certain Powers with reference to big work in prospective. In the meantime the business in hand is sufficiently large at present to keep the yard going full swing for some time to come, without the necessity of booking new orders. A large number of men are now busy in the construction of the British battleship *Revenge*, the keel of which was laid last month, after some delay occasioned by alterations to the slipway. These temporary delays at the beginning of the work of building the vessel will soon be more than made up for in the rapidity with which the work is now being taken in hand. A very great deal of the material for the building of the *Revenge* is already in hand, and it is understood the work of building the ship will be pushed on as quickly as possible. It is, of course, known that the Admiralty are anxious to get delivery of all warships at the dates specified in the contract, and it is believed they will be able to secure the *Revenge* in practically a record time, providing no labour difficulties arise, which may mean a stoppage of work. There is still more satisfactory progress in the building of the two light British cruisers, *Phaeton* and *Penelope*, one of which vessels will, it is expected, soon be ready for launching. The *Olympia* oil-tank oil-driven steamer of 8,000 tons, building for the Admiralty, is showing signs of getting well into frame. She is being built on the Isherwood system, and will, it is expected, be launched later on in the present year. The building of the new section of the Brazilian floating dock at Rio de Janeiro has been commenced, and it is expected the job will soon be finished ready for delivery in Brazil. The greatest possible activity is to be seen in the submarine department of Messrs. Vickers' works at Barrow, where the enlarged shed is crowded with orders for the British Admiralty. Some vessels of the "*E*" class have yet to be launched, together with a new and bold experiment in the "*F*" class, which will be the largest, fastest and most powerful sub-aqueous vessel ever built. This latest submarine will be shown to be a vast improvement on any vessel yet constructed for submarine work. It is not possible to get possession of dimensions, but the vessel will be longer than any submarine yet built and will possess much more devastating power than it has yet been found possible to embrace within the shell of a submarine. She will have the capacity of running long distances out to sea, and as she will be propelled with heavy oil engines her safety is secured and her power of reaching her base, however long the distance, will be assured. It is expected that this vessel will soon be launched, and then it will be possible to say more about her than is known at present.

Two Dreadnoughts.—The two "Dreadnoughts," the *Reshadieh*, built for Turkey, and the *Emperor of India*, built for the British Admiralty, which are berthed in the Buccleuch Dock, Barrow, taking in fitments to make them ready for service in case of war, are veritable hives of industry. Some thousands of men are employed on these vessels in the engineering, plumbing, electric and other departments, fixing up all the details which go to make a complete ship of war. Indeed, as many men are employed as the ships will accommodate. It is hoped to get the *Reshadieh* completed by the autumn, and the *Emperor of India* finished by the end of the year, providing no labour quarrel intervenes.

The Brazilian River Monitors.—The *Javory* and the *Solimoes*, two of the three river monitors built by Messrs. Vickers, Ltd., for river patrol in Brazil, have gone through their trials very satisfactorily, and now the *Madeira*, the third river monitor, is being completed ready to undertake her trials. When she has done these the three vessels will leave Barrow together for Brazil, and the work of delivering them has been undertaken by Messrs. Leopold Walford & Co., of London.

Engineers' Wages.—Some apprehension is felt at the prospect of a difficulty between Messrs. Vickers, Ltd., and their engineers, whose agreement terminates on the 31st of March next, and who have given notice of a demand for 6s. a week extra wages. It is known the firm are anxious to cover the agreement on the best terms possible, as it is not to their interest to stop work if it can be avoided. The proposal of the men to bring an end to the premium bonus system is, however, a difficult business, as if this is carried out it will reduce the producing power of their works to a considerable extent.

BELFAST.

(*From our Own Correspondent.*)

State of Trade.—The big drop in freights is bound to have its effect upon shipbuilding, and those firms who are mainly concerned with the construction of vessels of the tramp class will, of course, suffer most from the reaction. So far as Belfast is concerned no depression in trade will be felt, the local shipbuilders' orders being all of the regular liner class, and in addition to the big volume of work in hand towards the close of 1913, several important contracts—as mentioned below—have been placed with Messrs. Harland and Wolff and Messrs. Workman, Clark & Co.

Messrs. Harland & Wolff have received an order for four large refrigerated beef-carrying steamers for Messrs. Lamport and Holt. The two steamers for which the Red Star Line have contracted with them are to have a length of 670 ft. One will have a beam of 78 ft., while the other is to be 83 ft. Both will be triple-screw vessels driven by "Combination" machinery, and are intended for the Company's passenger service between Antwerp and New York. The first launch of the year from the Queen's Island will be that of the triple-screw liner *Euripides*, for Messrs. George Thompson & Co.'s Aberdeen line. The *Euripides*, which is a vessel of about 550 ft. in length, is building in Messrs. Harland & Wolff's south yard, and will shortly take the water. Her launch will be followed, on the 26th of February, by that of the White Star liner *Britannic* from the north end. At the fitting-out wharves Messrs. Harland & Wolff have the Royal Mail Steam Packet Co.'s mail and passenger steamer *Alcantara*, the Atlantic Transport Co.'s cargo boat *Missouri* (both built in the firm's Clyde yard) and the liner *Orduna*, for the Pacific Steam Navigation Co. The last named vessel will be ready for sea within the course of a week or so. In addition to these new steamers Messrs. Harland & Wolff have at present in hand for extensive overhaul and alterations the Atlantic Transport Co.'s *Minnehaha*, which was built at the Queen's Island in 1900. As an indication of the extent of Messrs. Harland & Wolff's operations it may be mentioned that the aggregate weekly pay in their various establishments—Belfast, Glasgow, Liverpool and Southampton—has, for some time past, considerably exceeded £40,000. This sum would have been even greater had they been able to obtain as many men as they require, for they are still handicapped for the want of riveters, of which they could do with a big number of additional squads.

Messrs. Workman, Clark & Co. are stated to have received orders for the construction of four fruit steamers for Messrs. Elders & Fyffes, and six for the Tropical Fruit Steamship Co. Messrs. Workman, Clark & Co. have built a big proportion of the former Company's fleet, and all of the Tropical Fruit Steamship Co.'s vessels, with the exception of four, are from the same builders' hands. It may be declared without fear of contradiction that no shipbuilding firm in the world is more thoroughly conversant with the requirements of the modern fruit-carrying trade. The fitting-out of Messrs. J. P. Corry & Co.'s twin-screw steamer *Star of Victoria*, launched from the North Yard in November, has been completed, and the vessel left Belfast on 14th January. The latest addition to the Star Line is 516 ft. long, with a gross tonnage of about 11,500. A sister-ship, named *Star of England*, will shortly be launched from the same yard, and it is worthy of note that the entire fleet belonging to this Company has been built by Messrs. Workman, Clark & Co. All are modern vessels, the oldest, a former *Star of England*, having been disposed of to Italian owners last year.

Harbour Works.— The contractors who have in hand the dredging operations in connection with the Harbour Commissioners' new developments of the port have made rapid progress with the work entrusted to them. The "cut" for the new deep-water fitting-out wharf has been almost completed, and at present the existing deep-water berth on the river side of the former is being dredged deeper for the accommodation of the *Britannic*. The various dredgings are being utilized for filling up the ground at the rear of Messrs. Harland & Wolff's engine works.

THE BRISTOL CHANNEL.

Cardiff, Penarth, Barry and Newport.

(From our Own Correspondent.)

DURING the past month the extensive ship-repairing trade of the Bristol Chanuel seemed to resume its usual winter character for activity, and the gales recently experienced in the Channel have been productive of a number of damage jobs. The new year has thus opened anspiciously for many of the establishments catering for that class of work, and as some of the work obtained is of a heavy character, it is anticipated that exceptionally good employment is in prospect for the many workers who participate in dealing with such work. Just at the time of writing the arrivals at the various wet docks are somewhat slow, but with the work already in hand at the varions repair shops the consequent slackness due to the slow arrival of tonnage is not yet apparent in the majority of cases. The brightest feature for Cardiff recently has been the success which has attended the efforts of the Mountstuart Dry Docks Co. in securing several heavy repair jobs in open competition with other firms throughout the kingdom, and it may reasonably be assumed that their success is in no small measure due to their far-famed reputation for high-class workmanship and rapidity of despatch. The same can also be said of the other important concerns in this district, and there is no other district dealing purely with ship-repairing work which can show a better all-round record for despatch and for the class of work undertaken. This satisfactory condition of affairs has only been attained, of course, by the enterprise and foresight of the management of the various concerns in providing machinery and tools of the latest description in conjunction with other time-saving devices.

Mountstuart Dry Docks, Ltd.—The dry docks of this company have been constantly engaged during the past month and the number of men employed has exceeded all previous records. In addition to the completion of the heavy repairs mentioned last month, there have been very heavy repairs to the steamers *Strathcarron, Antinous,* and *Gaea,* the two latter vessels having had their bows stove in by collision. It is interesting to note that the heavy contract repairs on the steamer *Den of Mains* were completed in considerably less time than was specified. At the moment of writing the s.s. *Waverley* has entered the dock and will reqnire extensive overhaul. Referring to the repairs to the steamer *Gaea,* it may be mentioned that this steamer was in collision on Christmas morning in the Bristol Channel with the steamer *Theresedal,* and on returning to Cardiff for examination it was found that a new stem bar and about eighteen bow plates would be reqnired, the entire work being subsequently carried out with the vessel fully loaded.

Channel Pontoon Co. have been very actively engaged on general and repair work at the several establishments under their control in the Bristol Channel, exceptionally heavy repairs being executed on the steamer *Nostrena.* This work included the replacing of about thirty bottom plates in addition to extensive general repairs, and was handled in the masterly manner characteristic of this concern. Another job of note was the execution of the required repairs to the steamer *Theresedal,* consequent on her collision with the steamer *Gaea,* the vessel being dry-docked and the work completed without the cargo being discharged. This firm also dealt with repairs to the steamers *Amberton, Leonatus, Maurizio, Wimborne, King Edward, Solva, Birmingham,* etc., and it may be mentioned that the outlook ahead is promising.

Hill's Dry Docks and Engineering Co. had a fair amonnt of docking and repair work completed and on hand, the principal work being on the steamers *Socoa, Cymrian* and *Channel Trader.*

Messrs. Shearman were well employed on general repairs to a large number of steamers at Cardiff, Barry and Avonmouth.

The Junction Dry Dock had overhauls to the steamers *Nonsuch* and *Bernard,* as well as other work of minor importance. The *Nonsuch* has changed ownership and may be noticed here as having been among the first of the tramp class to have a wireless outfit installed. At that time she was said to be one of the most modernly fitted tramp steamers afloat.

Messrs. Elliot & Jeffery, John Rodgers and T. Diamond and Co. enjoyed their usual run of general repair work on steamers in the wet docks, and are at present actively engaged. These firms, not possessing a dry dock of their own, are handicapped to a certain extent when prospective work is on the market.

The Penarth Pontoon Co. continues to secure a fair share of the available work and, among other jobs, executed overhauls to the steamers *Cap Breton* and *Normanby.* It is anticipated that this concern in the near future will be in a position to undertake a much larger volume of work than formerly.

Barry Graving Dock Co. were most actively engaged on general repairs in their dry docks to the steamers *Tremayne, Treloske, Rockabill, Gloria, Longhirst, Spithead, Apollo, Voltaire, Collingham, Zingara,* etc., and it is understood that a large amount of work is due to arrive.

Messrs. C. H. Bailey have been as usual briskly employed at their Barry and Newport establishments, amongst the vessels dealt with for general repairs being the steamers *Horsa, Apollo, Fane, Bahristan, Ethel, Wathfield, Frigga, Durham, Pentwyn, Llandrindod, Haulwen, Westhampton, Thistledhu, El Argentino, Windsor Hall,* the Barry Railway Co.'s dredger *David Davies,* etc., in addition to considerable bow damage to the steamer *Darwin,* sustained in collision with an unknown steamer in the English Channel, and bottom damage to steamer *Lotty.* From this list it will be seen that Messrs. Bailey have been fully employed, a condition of affairs not unnsual with that enterprising firm.

Swansea firms were very qnietly engaged throughout the month and there is no immediate sign of any recovery from that condition, but, in the ordinary course, with the plant available at Swansea work will naturally find its way there.

For all the Bristol Channel dry docks the past year was one of exceptional prosperity, and as the prospects for the present one are decidedly good it may be justly anticipated that the results will be gratifying. The falling of slipping freights has a salutary effect on the ship-repairing trade, as owners are more inclined to have their tonnage overhanled when moderate freights rnle, and so have their ships available when more remunerative rates are obtainable.

Newport.—It is understood that the famous Mannesmann Tube Co., of Landore, near Swansea, being faced with the necessity of extending their present works, and being practically limited for extension purposes on their present site, have conditionally fixed on a site at Newport, Mon., for the erection of new works. The choice of Newport as the probable location of the works has been influenced by the unrivalled facilities which that port offers for the importation of the steel from which the tubes are made, and also by the facilities which exist for the distribution of the finished article to all parts of the world. A word in relation to the products of the company may be interesting. The weldless steel tube manufactured by the company is largely employed in ship work, one of its special features being that the smaller sizes can be bent cold in place without trouble, so that the windings of a ship can be followed with a minimum number of joints. This latter feature is in itself a condition which can be appreciated by seafaring people. The pipes are practically unbreakable, and for some situations are furnished with a jute covering which renders them almost indestructible. The workmen employed at the manufacture are amongst the best paid of any industry in the country, so that an immense advantage must accrne to Newport and South Wales by the establishment of the new works.

An interesting item comes to hand from Newport. An immense anchor, stated to be the largest in the world, and weighing about seventeen tons, was recently shipped at Newport for conveyance to Belfast, presumably for nse on one of the leviathans under construction there. This anchor was produced at Dudley and must be a record for weight.

The Antarctic Ship "Terra Nova."—The figurehead of this famous ship has, by the courtesy of Messrs. Bowring, the present and former owners of the craft, been detached from the vessel and presented to the City of Cardiff, and it is now installed in Roath Park as a memorial of the ill-fated expedition, which took its departure from Cardiff and which returned to this port at the termination of the enterprise. The unveiling ceremony was performed by Commander Evans.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Wm. Dobson & Co., Newcastle-on-Tyne.

DELAGOA. January 19th. Steel screw steamer built to the order of Messrs. Det Ostasiatiske Kompagnie of Copenhagen, for their South African trade. This vessel has been built to Lloyd's 100 A1 class, shelter-deck type and has the following dimensions :—Length between perpendiculars, 360 ft. ; breadth, 52 ft. ; depth to main deck, 26 ft. The deadweight carrying capacity is over 7,000 tons. The machinery, which is being constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, has cylinders 25 in., 41 in. and 69 in. diameter by 48 in. stroke, and there are three large boilers 180 lbs. working pressure.

W. Doxford & Sons, Sunderland.

ROMAN PRINCE. Steamer built for the Prince Line, Newcastle. She is a shelter-deck vessel with 'tween decks, 434 ft. long, 54 ft. broad, and a moulded depth of 29 ft. She has a deadweight of 9,000 tons, and is built to take the 100 A1 classification in Lloyd's Register. She will be engined by Messrs. Doxford.

R. & W. Hawthorn, Leslie & Co., Hebburn-on-Tyne.

TROILUS. December 27th, 1913. A steamer the dimensions of which are—length 452 ft., beam 56 ft. 5 in., with a deadweight carrying capacity of 9,500 tons. She is specially designed for the Eastern trade, and is fitted with an elaborate and complete system of cargo gear, comprising seventeen derricks, and twenty-four winches, capable of dealing with lifts of from two to 50 tons. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout all the bunkers. Accommodation is provided in deck-houses amidships for first-class passengers, and her 'tween decks are suitable for carrying Chinese emigrants. The machinery is being constructed at Wallsend, and consists of a set of triple-expansion engines having cylinders 31 in., 51½ in. and 86 in. by 60 in. stroke, steam being supplied by three powerful boilers.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

MAGDALA. December 27th, 1913. Steamer built to the order of Messrs. The East Asiatic Company of Copenhagen. The vessel is about 372 ft. long by 52 ft. beam by 34 ft. deep, of the single-deck type with shelter deck, and has been built under special survey to the highest class at Lloyd's Register. She will carry over 7,100 tons on a light draught and steam about 10 knots loaded at sea. There are ten steam winches, steam windlass and a large number of cargo derricks and the usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consisting of engines with cylinders 25 in., 41 in. 69 in., by 48 in. stroke, three large boilers with 180 lbs. pressure.

Wm. Pickersgill & Sons, Ltd., Sunderland.

POLYKTOR. December 20th, 1913. Built to the order of Mr. G. C. Dracoulis, of Braila. She is of the single deck type with long bridge and fitted out in every way as an up-to-date cargo steamer, with specially efficient arrangement of deck machinery for rapid handling of cargo, to carry about 7,200 tons on a light draught. Her engines are of ample power to secure a good speed at sea, and built by Messrs. George Clark, Ltd., of Southwick. The vessel has steel centre division and is fitted up for grain to secure exemption under the Grain Cargoes Act. Captain Gratsos superintended the construction of the vessel and will take command of her on her maiden voyage.

Palmers Shipbuilding & Iron Co., Ltd., Jarrow.

H.M.S. LUCIFER. December 29th. The second of two torpedo-boat destroyers, the hulls of which Palmers Company are building for the Parsons Marine Steam Turbine Co., Ltd., who are the main contractors to H.M. Government for the vessels. The sister ship *Leonidas* is at present alongside the Palmers' Co.'s works, after having received her machinery.

John Readhead & Sons, Ltd., South Shields.

NEWQUAY. January 13th, 1914. Steel screw steamer, built for Messrs. J. J. & C. M. Forster, Newcastle-on-Tyne. Dimensions :—381 ft. by 51 ft. by 27 ft. 8½ in. She is of the improved single-deck type to Lloyd's highest class, and under their special survey, having poop, extra long bridge and topgallant forecastle, with deep girder framing and cellular double bottom fore and aft, with large after-peak tank for water ballast ; holds clear of beams and other obstructions. The outfit of the ship is complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend.

SAN LORENZO. December 27th. Large steamship for carrying oil in bulk built for the Eagle Oil Transport Co., Ltd., of London. The *San Lorenzo* is to carry some 15,500 tons of oil, and is the last of three sister ships that Messrs. Swan, Hunter & Wigham Richardson, Ltd., launched last year and the seventh built by them during 1912 and 1913 for the same owners. Like the *San Fraterno* and the *San Gregorio* the ship that has just been launched is 541 ft. long, with a breadth of 66½ ft., built upon the Isherwood system of longitudinal framing and to the highest class of Lloyd's. The quadruple-expansion engines and boilers are being built by the Wallsend Slipway and Engineering Co., Ltd., and will be placed in the after end of the ship. The boilers are fitted with patent apparatus for burning liquid fuel. The *San Lorenzo* has two pump rooms containing four powerful oil pumps. The oil holds, together with the oil cross-bunker, are divided into twenty-six compartments by transverse and longitudinal oil-tight bulkheads. Comfortable quarters are provided for the captain, engineers and officers, the former being in the bridge-house amidships, and the latter in the poop. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" solution has been applied throughout the cellular double bottom and their patent "Bitumastic" covering to the tank top.

TEES AND THE HARTLEPOOLS.

Wm. Gray & Co., Ltd., West Hartlepool.

BANKA. December 27th, 1913. Steel screw steamer, built for The Netherland Steamship Co., Amsterdam. The vessel will take the highest class in Lloyd's Register, and the dimensions are :—Length overall, 433 ft. 6 in. ; breadth, 54 ft. 6 in., and depth, 36 ft. She is of the awning deck type, having three decks laid. In addition to cellular double bottom and after-peak tank for water ballast, there is a deep tank or hold compartment fitted abaft the engine-room giving a total capacity for water ballast of about 2,200 tons. The whole of the outfit, including twenty-seven steel derricks and one to lift 30 tons, steam windlass, direct steam-steering engine controlled by telemotor gear, and eighteen steam winches, ventilation, sanitary arrangements, etc., are of the most approved description. Electric lighting is fitted in all accommodation and working parts, as well as fixed lights in all cargo compartments. The engines are of the triple-expansion type, supplied by The Central Marine Engine Works of the builders, having cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 54 in., and four large steel boilers adapted for 180 lbs. working pressure per square inch, and fitted with Howden's system of forced draught. A special feature of the boiler installation is the "Cmew" type superheater, designed and made by the engine builders with a view of utilizing to the utmost the heat from the gases on their way to the funnel. A special system of "Cmew" auxiliaries, including a winch condenser, evaporator, independent feed pumps, combined with a gravitation filter and feed water heater arranged to utilize the heat from the exhaust steam, will be installed in the engine-room.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

CASTLE EDEN. January 14th, 1914. Steel screw steamer launched from the Harbour Dockyard and built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool. Dimensions :—289 ft. 6 in. by 40 ft. 2 in. by 20 ft. 6½ in. She has a single deck, with poop, bridge and topgallant forecastle, and is built to the British Corporation

Registry's highest class. A double bottom is fitted throughout on the cellular principle, the after peak is arranged as a trimming tank, and the vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes. Four transverse bulkheads are fitted, dividing the vessel into five water-tight compartments; there are four large cargo hatches and the vessel is replete with all the latest improvements for loading and discharging expeditiously. A powerful quick-warping steam windlass is fitted forward for working the cables, and combined steam and hand-steering gear is fitted in a house aft, with telemotor attachment to the bridge. A Cochran (Annan) donkey boiler, with patent seamless furnace, has also been fitted. Steam heating is fitted to the midship accommodation, and the sanitary, ventilating and lighting arrangements are effected on the most improved lines. Triple-expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 20½ in., 33 in. and 54 in. by 36-in. stroke, with two large single-ended boilers, working at a pressure of 100 lbs. per square inch.

EGYPTIAN TRANSPORT. December 24th, 1913. Launched from the Middleton Shipyard, steel screw steamer built to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd. (Messrs. Houlder Brothers and Co., Ltd., managers), London. Dimensions :—400 ft. by 52 ft. by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation classification having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep-frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven water-tight compartments by means of six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided and a cross-bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting into a tank in the engine-room and twelve derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. A large ice house is also fitted for the crew's provisions, etc. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, consists of a set of "Richardsons" standard triple-expansion engines having cylinders 25 in., 40 in. and 68 in. by 48 in. with three large boilers, 180 lbs. pressure. The condenser is of the Contraflo type with temperature regulator, and the engine-room auxiliaries include a cascade feed-water heater and filter, a Morison evaporator, large ballast donkey and harbour feed pump, etc.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

SICILY. December 31st, 1913. Steel screw steamer, built to the order of Messrs. David MacIver, Sons & Co., Ltd., of Liverpool. She will take the highest class in British Corporation Registry, and is constructed on the Isherwood system. The general particulars are :—Shelter deck steamer with two complete and one partial decks, also poop and forecastle; length overall, 394 ft.; breadth extreme, 48 ft.; depth moulded to shelter deck, 35 ft. 4 in.; gross tonnage, about 3,450 tons. The vessel will be fitted with engines by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, of the following sizes, *viz.*, 26 in., 42 in., 70½ in. by 45 in., with three boilers 15 ft. 9 in. by 10 ft. 6 in., 180 lbs. pressure, which are expected to drive her a speed of 11 knots in ordinary working at sea. Both hull and engine specifications are largely in excess of usual specifications and are designed to fully meet the requirements of the owners' South American trade. Special attention has been paid to the loading and discharging arrangements, which include ten steam winches, large horizontal multitubular donkey boiler, a full outfit of derricks (fourteen in all), including two to lift 20 tons each, and two to lift 15 tons each, and the vessel will be fully fitted up in all respects as a modern first-class cargo steamer.

Ropner & Sons, Ltd., Stockton-on-Tees.

LORD TREDEGAR. December 27th, 1913. Steel screw shelter-deck steamer, of the following dimensions :—Length, 398 ft. 3 in.; breadth, 51 ft.; depth, 32 ft. 4 in., shelter, 24 ft. 10 in. upper. The vessel is built to the highest class at Lloyd's, to the order of Mr. T. H. Mordey, of Messrs. Williams & Mordey, Cardiff. The vessel has double bottom for water ballast on the cellular principle, also in the fore and after peaks, for a large quantity of water ballast. The deadweight carrying capacity will be about 7,000 tons on her summer freeboard. She will be fully equipped with an up-to-date outfit, and with Admiralty requirements for transport work, having a quick-warping windlass, stockless anchors, steam-steering gear amidships, with powerful screw gear aft. The appliances for loading and discharging expeditiously are very complete, and include double derricks and ten steam winches, steam being supplied by a horizontal multitubular donkey boiler. She is fitted with an electric light installation throughout. The engines will be of the triple-expansion type, supplied by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 1,800 i.h.p., steam being supplied by two large main boilers at a working pressure of 180 lbs. per square inch. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

MAROC. January 15th, 1914. Steel screw trawler. The principal dimensions are 175 ft. by 29 ft. by 15 ft. moulded. She is the largest steam trawler afloat and has been specially built for the Newfoundland fishing to the order of Mr. J. Huret, of Boulogne, France. She will be fitted with powerful triple-expansion engines and large boiler by Messrs. Amos & Smith, Ltd., of Hull. The vessel will have accommodation for a crew of about fifty hands, and will be fitted with powerful steam trawl winch, steam windlass, steam-steering gear and electric light throughout. She has also an insulated fish-room, large tanks for carrying fresh water for the boiler and is to be fitted with wireless telegraphy.

SOUTH OF ENGLAND.

John I. Thornycroft & Co., Ltd., Southampton.

MARGARET. January 14th. Revenue cruiser, built to the order of the Canadian Customs Department for patrol service on the Atlantic coast. The vessel took the water in an unusually advanced condition both as regards hull and machinery, the accommodation, etc., as well as the propelling equipment being practically complete, and was in fact almost ready for trial when floated. The principal dimensions are as follows :—Length overall, 200 ft.; length between perpendiculars, 185 ft.; breadth moulded, 32 ft.; depth moulded, 16 ft.; the draught is limited to 10 ft. 6 in. when carrying a load of 175 tons. A ram stem and cruiser stern add to the appearance of the boat, which indeed is a fine looking craft. A double bottom is fitted under the engines and the hold forward, and the hull is stiffened to resist ice, the propeller shafting being also housed in the hull for the whole of its length to prevent damage by ice. Water-tight bulkheads divide the various compartments and the bunkers are water-tight also. Sliding water-tight doors of the quick-closing type are fitted to be worked from the upper deck. The bunkers have a capacity of 200 tons, giving a radius of action of nearly 2,000 miles at full speed, and about 4,000 miles at economical speed. The vessel is rigged as a fore and aft schooner, and has an outfit of boats consisting of a 30-ft. Thornycroft motor launch, a 26-ft. lifeboat, a 22-ft. captain's cutter, and a 16-ft. dinghy. For armament the vessel carries, mounted on the forecastle deck, two 6-pounder quick-firing guns of Vickers' latest improved type, with telescopic sights. The vessel is fitted in a most up-to-date manner, carries a wireless telegraphy outfit, is electrically lighted and has a 24-in. projector searchlight of 25,000 c.p. fitted in the crow's nest on the foremast. A refrigerating plant is installed, and a complete cold store below contains separate rooms for meat, vegetables and other provisions. The vessel is heated by steam throughout. The propelling machinery consists of two sets of vertical reciprocating engines running at 180 revolutions per minute,

and having a combined i.h.p. of 2,000. The l.p. cylinders exhaust each into a separate condenser, to which the circulating water is delivered by independent centrifugal pumps. A 15-ton evaporator by Messrs. Weir is installed, and the main and auxiliary feed pumps are also of Weir's make. Steam is supplied by two boilers of the water-tube type.

NORTH-WEST OF ENGLAND.

Cammell, Laird & Co., Birkenhead.

CANADIAN CAR FERRY AND ICE-BREAKING STEAMER. January 17th. Built for the Transcontinental Railway Co., of Canada. She is intended for service on the river St. Lawrence between Quebec and Levis. Her principal dimensions are :—Length 326 ft., beam 65 ft., with a draught of about 15 ft. The propelling machinery consists of two sets of triple-expansion condensing engines, steam being supplied by eight single-ended cylindrical boilers working under natural draught. An ice propeller of nickel steel driven by a compound condensing engine is fitted at the forward end of the vessel, which is built to Lloyd's special survey, and is arranged for the carriage of passenger and freight trains at all seasons of the year. The trains are carried on a tidal deck arranged above the main deck of the vessel—on three lengths of track, the length of each track being about 272 ft. The tidal deck rests on castings working up and down on ten vertical lifting screws on each side, supported on columns, the columns being stayed by lattice buttresses against longitudinal transverse thrusts. The lifting screws are hung on ball bearings from the top and are manipulated by means of worm wheels driven from horizontal shafting, which runs the length of the vessel on each side. The horizontal shafting is worked by bevel gearing from a four-cylinder high-pressure engine of special design situated below the main deck. The gearing is arranged to lift the tidal deck fully loaded with a train and locomotive weighing about 1,400 tons at a rate of one foot per minute, to a height of about 80 ft., which enables the ferry to be loaded or unloaded at any state of tide. At each end of the tidal deck an adjustable hinged gangway is suspended, which allows for any change of trim or heel of ship due to unequal distribution of weights while taking the coaches, etc., on or off the vessel. Above the highest position of carriages on the tidal deck a promenade is arranged all round the vessel, with a bridge platform forward, from which all the operations of steering and manœuvring are directed. The boiler rooms are arranged in wing compartments amidships with the coal bunkers and the tidal deck engine room between them. The main propelling engines are situated abaft the boiler rooms and the engine for the ice propeller is placed in the hold just abaft the fore peak bulkhead. The vessel is fitted with electric light throughout and electric gear is provided for raising and lowering the end gangways and for hauling the railway carriages on or off. Special arrangements are made for heating the carriages during transit. Double windlasses are fitted, one on each side, with slip drum for mooring.

LAUNCHES—Scotch.

Barclay, Curle & Co,, Whiteinch.

MASHOBRA. December 30th. Twin-screw steamer, built to the order of the British India Steam Navigation Co. The vessel is of the following dimensions :—Length, 464 ft. ; breadth, 58 ft. ; depth, 36 ft., and of 8,500 tons gross.

BANDRA. December 15th. Screw steamer, built to the order of British India Steam Navigation Co., 3,370 tons gross, 2,500 i.h.p., one of three sister ships now building by the firm. The vessel is about 340 ft. in length and is the first vessel constructed by Messrs. Barclay, Curle & Co., Ltd., at their Elderlie yard. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the tanks, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

FERENCZ FERDINAND. December 30th, 1913. Steel screw steamer for the Royal Hungarian Seal Navigation Co., "Adria," Ltd., Fiume. Immediately after the launch the vessel was placed in the Company's dock to receive her machinery, which has also been constructed by the builders.

Caledon Shipbuilding & Engineering Co., Dundee.

SELENE. December 26th. A twin-screw motor oil-tank vessel for the Anglo-Saxon Petroleum Co., London, of the following dimensions :—Length overall, 356 ft. 9 in. ; breadth moulded, 46 ft. ; depth moulded, 27 ft. 7 in. ; and gross tonnage, about 3,850. She has been built to Lloyd's highest class, and her propelling machinery consists of two sets of Diesel oil engines. She is designed for the carriage of oil in bulk, and has twenty-eight oil-tank compartments.

Messrs. William Denny & Brothers, Dumbarton.

HORORATA. December 29th. Twin-screw steamer for the New Zealand Shipping Co., London. She is the largest vessel yet built at Dumbarton, being 510 ft. in length between perpendiculars, 64 ft. in breadth moulded, and 42 ft. 6 in. in depth to shelter deck. Her holds are adapted to the carriage of frozen meat, and she has accommodation for over 1,200 passengers. In accordance with Admiralty arrangements for arming merchant ships which are food carriers, she will mount a pair of 4·7 in. guns. The propelling machinery, consisting of two sets of quadruple-expansion engines, balanced on the Yarrow, Schlick and Tweedy system, is being fitted by Messrs. Denny & Co. The vessel has been constructed to the classification of the British Corporation Registry.

John Fullerton & Co., Paisley.

BROADGREEN. January 16th. Steel screw steamer of 830 tons deadweight capacity—the second of four which they are building to the order of the West Lancashire Steamship Co. (Messrs. Alfred Rowland & Co., Liverpool) for their coasting trade. Triple-expansion machinery of 650 i.h.p. is being supplied by Messrs. Ross & Duncan, Govan.

Greenock & Grangemouth Dockyard Co., Grangemouth.

HOLMPARK. December 13th. Screw steamer for the Denholm Line Steamers, Greenock, 250 ft. in length between perpendiculars, 37 ft. in breadth, and 18 ft. 7 in. in depth (moulded). She will carry a deadweight of 2,365 tons on a mean draught of 17 ft. 2 in. She is fitted with steam windlass, steam-steering gear and special steam winches. Triple-expansion engines designed for a high rate of speed will be supplied by Messrs. Cooper & Greig, Dundee.

Alexander Hall & Co., Aberdeen.

PRINCESS MARY. January 15th. A steam trawler built for the Dodds Steam Fishing Co. The dimensions of the vessel are :—Length, 120 ft. 6 in. ; breadth, 22 ft. 6 in. ; and depth, 13 ft.

Russell & Co., Port Glasgow.

LOCH-NA-TORRAN. December 26th. Screw steamer of the following dimensions :—385 ft. in length, 52 ft. in breadth, 29 ft. in depth, and of 4,572 tons gross. She has been built for British owners to the highest class at Lloyd's. The vessel will be supplied with engines having cylinders 25 in., 41 in. and 68 in. in diameter respectively, and a stroke of 48 in., by Messrs. Rankin & Blackmore, Greenock.

Scott's Shipbuilding & Engineering Co., Greenock.

AGAPENOR. January 16th. Steamer built to the order of Messrs. Alfred Holt & Co., Liverpool. She is the second of two vessels for which Messrs. Holt contracted with Scotts' Co., being a sister ship to the *Helenus*, which was launched in October of last year. She will be engaged in passenger and cargo service in the East. The *Agapenor* is 470 ft. in length, 53 ft. 3 in. in breadth, 35 ft. 3 in. in depth, and 7,550 tons gross. Triple-expansion engines will be supplied by the builders.

Alex. Stephens & Sons, Ltd., Linthouse.

TAKADA. December 27th, 1913. Twin-screw steamer for the Eastern service of the British India Steam Navigation Co., Ltd. The dimensions are :—Length, 430 ft. ; breadth, 58 ft., and depth, 40 ft., and she is to be fitted up for the accommodation of about 100 first and second-class passengers and a large number of native passengers. Her cargo gear and outfit are of superior type, as usually supplied to the British India Co. The propelling machinery consists of two sets of triple-expansion engines, with five large single-ended boilers, all constructed at Linthouse.

Foreign Launch.

Antwerp Engineering Co., Hoboken, Belgium.

DATETREE. Steamer, constructed for Messrs. Howard, Jones & King, of Cardiff. The vessel is intended for the transport of coal, has self-trimming holds, and her principal dimensions are 270 ft. by 40 ft. by 20 ft., net tonnage 2,600, speed (laden) 10½ knots. The company have under construction a steamer of 8,000 tons for Messrs. James Chambers & Co., of Liverpool, which is to be launched next month, and three other steamers for various owners of 2,000 tons each. The keels of two more steamers of 3,000 tons each will be laid at the end of February and beginning of March respectively.

TRIAL TRIPS.

English, Scotch and Irish.

Barclay, Curle & Co., Whiteinch.

LLANDOVERY CASTLE. Twin-screw steamer for the Union-Castle Mail Steamship Co., ran trials on the Firth of Clyde recently. During the trials the machinery worked satisfactorily and a mean speed of 15½ knots per hour was obtained. For Launch, see October issue.

Cammell, Laird & Co., Ltd., Birkenhead.

KHIVA. January 6th. The first of four steamers building at Birkenhead, for the P. and O. Co.'s Eastern trade, left the Mersey for Antwerp, after being taken over by the owners' representatives. Owing to heavy weather the usual trial trip was dispensed with. The dimensions of the vessel are:—Length between perpendiculars, 480 ft.; breadth moulded, 58 ft.; depth moulded, 36 ft. 6 in.; loaded draught, about 28 ft.; speed, 14 knots; i.h.p., about 7,000; gross tonnage about 8,800, and a deadweight capacity of approximately 10,200 tons. Her loaded draught is about 28 ft., and her engines, of 7,000 i.h.p., are designed to give her a sea speed of 14 knots. The *Khiva* is built of steel, in accordance with Lloyd's 100 A1 class, and has a Board of Trade passenger certificate. Quarters for native crew are provided in the topgallant forecastle, the bridge and poop houses being fitted up for the accommodation of passengers, officers and engineers. The vessel is divided into eight water-tight compartments, the bulkheads all extending to the upper deck. Accommodation is also provided for seventy-five first-class passengers in cabins on upper and bridge decks, and for sixty-eight second-class passengers in cabins on the upper deck. Ten powerful cargo winches have been provided for dealing with large quantities of cargo, in addition to four steam cranes, each capable of lifting five tons. Four derricks are fitted to two pole masts, and there is also one large derrick forward for lifting a weight of 30 tons. Refrigerating machinery is fitted, and large chambers have been arranged for meat and provisions. Ample lifeboat capacity is provided for all on board. The general smoking and music rooms are tastefully decorated and upholstered in the builders' usual first-class style. Electric light has been installed throughout the vessel. A patent steam tiller operates the rudder, and is controlled by telemotor gear from the bridge wheelhouse and flying bridge. A wireless installation is fitted, with receiving and sending house for operator on bridge deck. She is fitted with quadruple-expansion engines, the cylinders being 23½ in., 34½ in., 48½ in. and 70 in. by 46 in. stroke. They are balanced engines, designed to run at about ninety-five revolutions per minute. Steam is supplied by two double-ended and two single-ended boilers at a pressure of 215 lb. per square inch, and the engines are capable of developing about 7,000 indicated horse-power. Forced draught is installed. All the auxiliary machinery is of the most modern type. The propellers are of the built type, with cast-iron boss and manganese bronze blades. A very complete workshop and store-room, supplied with electrically-driven lathe, drilling machine, etc., has been fitted up. The machinery spaces have an unusually large number of ventilators to ensure cool engines and boiler room in the hot climate through which the vessel passes, large up-cast and down-cast electrically-driven fans being fitted in the engine-room. Messrs. Matthew Keenan & Co., Ltd., have the contract to coat the whole of the boiler and steam pipes and the bulkhead with their patent compositions. The hull and machinery have been constructed to the latest requirements of the Board of Trade and Lloyd's Registry. The vessel is the first of a new class of steamers which the P. and O. Co. have under construction, and represents the most recent development in their requirements for intermediate passenger and large cargo vessels. Messrs. Cammell, Laird & Co.'s relations with the P. and O. Co. date back to over sixty years ago, when they constructed two of the earliest boats of the fleet, the *Nubia* and *Pera*, which, at the time, were the largest turned out by the famous Birkenhead firm since its establishment in 1829. The *Khiva* left London on January 24th, with passengers and cargo, for China and Japan, under the command of Captain George Mannering Montford, R.D., R.N.R.

Grangemouth Dockyard Co., Grangemouth.

SAINT KENTIGERNS. This steamer, built for Messrs. A. MacKay & Co., Glasgow, has recently completed her trials on the Firth of Clyde. The vessel exceeded her contract speed on the measured mile, and on a run between the lights attained a speed of 12¾ knots per hour.

W. Gray & Co., Ltd., West Hartlepool.

HACKNESS. December 16th. The trial trip took place on the above date of this steel screw steamer. An average speed of 12½ knots was obtained, the performance of ship and machinery being entirely satisfactory. Captain Bruce was in command. For Launch, see January issue.

Wm. Hamilton & Co., Ltd., Port Glasgow.

RADJA. November 1st. On the measured mile off Skelmorlie during the speed trials a maximum speed was attained of 15½ knots. While, as the mean of a number of runs and circuition manœuvring, with the engines working at a uniform rate of revolution, a speed of close on 15 knots was maintained. For Launch, see October number.

Edward Hayes, Stony Stratford.

STEAM TUG. January 19th. The trials of a new iron-plated steam tug, which has just been built for work in Mauritius, were run on the above date. She is 56 ft. long, 12 ft. 6 in. wide, and draws 5 ft. of water. Her machinery consists of a set of "Hayes" standard C.S.C. engines, having cylinders 8 in. and 16 in. diameter by 10 in. stroke, with a large marine boiler built under Lloyd's survey for 125 lbs. per square inch w.p. The vessel is specially designed for working in tropical climates, having a large and well ventilated engine-room and stokehold, and cabin spaces fore and aft insulated inside the hull against the heat. Her mean speed with and against the tide was 11·6 m.p.h., about a mile in excess of her contract speed.

Irvine's Shipbuilding & Dry Docks Co., West Hartlepool.

ROYAL TRANSPORT. December 20th. This steel screw steamer proceeded on her official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12 knots being attained. For Launch, see December issue.

STANLEY. January 19th. This steel screw steamer had her official trial trip in Hartlepool Bay on this date. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 13 knots being attained, and the vessel afterwards proceeded on her voyage. For Launch, see January issue.

Northumberland Shipbuilding Co., Howdon-on-Tyne.

MENDIP RANGE. January 2nd. Steel screw steamer built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Neptune Steam Navigation Co., Ltd., left the Tyne for her official trial trip. The trial trip proved in every way satisfactory and a speed of 12 knots was obtained. For Launch, see December issue.

Osbourne, Graham & Co., Sunderland.

FIGULINA. January 9th. Official trial trip run, the contract speed being easily exceeded. For Launch, see November issue.

Palmers' Shipbuilding & Iron Co., Jarrow.

SAN HILARIO. December 30th. Oil-tank steamer built to the order of the Eagle Oil Transport Co., Ltd., was taken to sea for her trials. The trial was in every respect successful, the engines working very smoothly throughout, and the contract speed of 11¼ knots was exceeded. At the conclusion of the trial the vessel returned to the Tyne to take in a large quantity of bunker oil, preparatory to leaving for the East. For Launch, see January issue.

W. Pickersgill & Sons, Sunderland.

NEWLYN. January 5th. Steamer built for Messrs. J. J. & C. M. Forster, of Newcastle, ran trials, after which she bunkered in the Tyne and proceeded to Cardiff for her cargo. On the run round she averaged a speed of over 11 knots easy steaming, the engines, etc., giving entire satisfaction. For Launch, see January issue.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

WOLVERTON. January 10th, 1914. Steel screw steamer built to the order of Messrs. The Denaby & Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trials. The vessel has been built to 100 A1 at Lloyd's, and is of the single-deck type, with poop, bridge and topgallant forecastle. Her principal dimensions are 372 ft. by 52 ft. by 26 ft. 3 in. moulded, and she will carry about 7,200 tons on a light draught of water. Saloon and accommodation for captain are provided in large deck-house at fore end of bridge, with chart-house on top. The engineers and officers are berthed in houses at sides of engine casing, while the crew will be located in forecastle. The vessel has four large holds, five hatches, two masts, eleven derricks, and is equipped with ten steam winches, steam windlass, hand and steam-steering gear and all the latest and most modern appliances for the rapid handling of cargo. Triple-expansion engines, having cylinders 25 in., 40 in. and 67 in. by 45 in. stroke, supplied with steam by three large single-ended boilers, working at 180 lbs. pressure, have been fitted by Messrs. George Clark, Ltd., Sunderland. The trials passed off most successfully and the vessel proceeded to Hull under the command of Captain Nicholson, where she will load. The hull and engines have been constructed under the superintendence of Mr. W. W. Nicholas, of Messrs. Nicholas & Meek, Hull. For Launch, see January issue.

TASCALUSA. December 16th. Steel screw tank steamer built to the order of the Tank Storage and Carriage Co., Ltd., of London, proceeded to sea for her official trials. The trials passed off successfully and the vessel returned to Middlesbrough. Captain H. D. Clarke commands her. For Launch, see December issue.

Rennie-Forrestt Shipbuilding & Engineering & Dry Dock Co., Ltd., Wivenhoe.

MANSA KILA BA. December 23rd. This vessel was taken for trial at sea, and contract speed fully maintained. For Launch, see November issue.

Ropner & Sons, Stockton-on-Tees.

SAXILBY. January 3rd. This steamer had her official trial trip in Tees Bay. She has been built to class 100 A1 at Lloyd's, and is for Messrs. R. Ropner & Co., West Hartlepool. She is about 358 ft. 6 in. long, and has a deadweight carrying capacity of about 6,580 tons. The engines are of the triple-expansion type, of about 1,500 i.h.p. On her trial the vessel behaved in a thoroughly satisfactory manner. After some very satisfactory runs, during which the vessel attained a speed of about 11¼ knots, she proceeded to the Bristol Channel.

Robert Thompson & Sons, Ltd., Sunderland.

BERTRAND. December 13th. On the trial trip the engines worked splendidly, and a mean speed of about 11 knots was easily attained. For Launch, see December issue.

DEN OF EWNIE. Recently went to sea for her official trial trip, which gave complete satisfaction to all on board, a mean speed of 12¾ knots being easily maintained on the measured mile. The vessel has been specially built to the order of Messrs. Charles Barrie & Sons, of Dundee. The principal dimensions are:—Length, 403 ft. 5 in.; breadth extreme, 54 ft. 2 in.; depth, 36 ft. 7½ in. She has been constructed to Lloyd's highest class, on the single-deck rules, and with a complete shelter deck right fore and aft. Water ballast will be carried in a cellular double bottom and in the fore and after peaks. The triple-expansion engines have cylinders 27½ in., 44½ in. and 74 in. by 48-in. stroke, supplied with steam by three large boilers working at 180-lbs. pressure.

CHESTERFIELD. December 9th. Steamer, the latest addition to the fleet of the Great Central Railway, completed a very successful trial trip, and on conclusion sailed for Grimsby to take up her station in the service carried on by the Company between Grimsby and Rotterdam. On the trial trip which was made fully loaded everything worked entirely satisfactorily and the vessel was driven at a speed of 13¾ knots per hour. For launch, see December issue.

Workman, Clark & Co., Belfast.

STAR OF VICTORIA. January 14th. Twin-screw steamer built for the Star Line of steamers, owned by Messrs. J. P. Corry & Co., of London, left Belfast Harbour and proceeded to Carrick Road, where machinery tests and speed trials were carried out. The results were highly satisfactory and the vessel afterwards left for London to take in cargo for the first voyage to Australia. For Launch, see December issue.

CALAMARES. December 3rd. Twin-screw steamer, built for West Indian fruit-carrying and passenger service, went on her trial trip this date. For Launch, see October issue.

CARDIGANSHIRE. November 25th. Twin screw steamer built for the Royal Mail Steam Packet Co., left Belfast Harbour and proceeded to Carrick Roads, where compasses were adjusted and machinery tests and speed trials were carried out. The results were most satisfactory and the vessel afterwards left for Antwerp to take in cargo for her initial voyage. For Launch, see November issue.

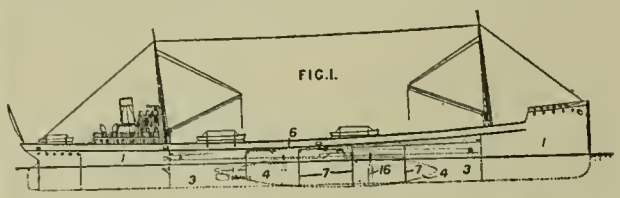
Harland & Wolff, Ltd., Belfast.

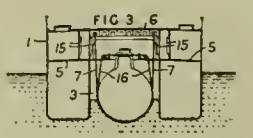
ORDUNA. January 22nd. Triple-screw mail and passenger steamer, built to the order of The Pacific Steam Navigation Company, Liverpool, left the builders' hands, and after a satisfactory trial proceeded to Liverpool. For Launch, see November issue.

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

18,352. Ships. Relates to vessels for raising and transporting submarine vessels and other sunken vessels or bodies of the kind having a recess in communication with the surrounding water, into which the body can be raised. The vessel 1 has a recess 3 to receive a submarine 4 and also decks 5, 6, the lower one 5 of which accommodates the operators. Hatches are provided in the deck 5 for the lifting ropes 7,

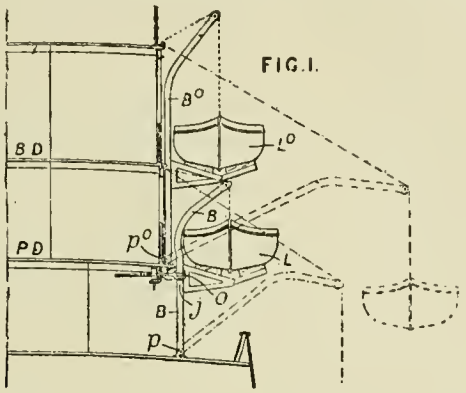


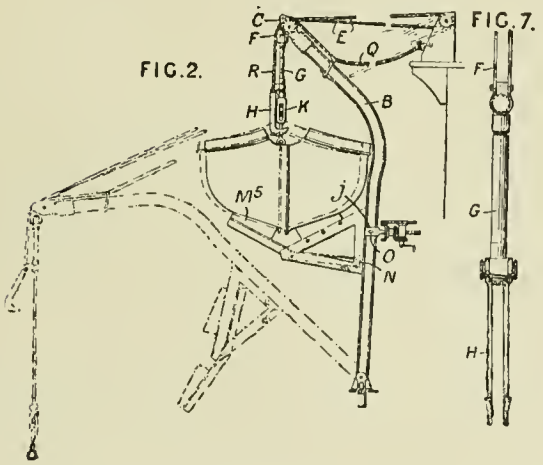


and the deck 6 is made water-tight. Air-locks 15 are constructed between the decks 5, 6 so that after the submarine has been raised to the surface of the water, compressed air may be supplied beneath the deck 6 to force the level 3 of the water downwards. Slings 16 support the submarine and relieve the load on the ropes 7.

21,046. Davits, etc. Davit apparatus is constructed in a number of superposed tiers and is characterized by the fact that the davits of different tiers have different outreaches. Boats L, L° are carried in davits B, B° pivoted at *p*, *p*° so that there is one tier of boats L accessible from the promenade deck P D and another tier L° accessible from the boat deck B D. The davits B° of the upper tier have a greater outreach than those B of the lower tier, so that a boat from either tier may be lowered independently of any other boat. At the head of each derrick B is a housing C containing sheaves for the fall E. A hollow rod G is pivoted

to a plate F in the housing, and carries a suspension hook H. To lower a boat the falls are held in a winch end and a pin *o* removed from a jaw *j* holding the davit in a vertical position, lever catches N are locked back so as to allow the outer chocks M^5 to fall, and the boat is then lowered, being held





clear of the side by the derrick. A block K is held by the hook H until the davit has fallen far enough to tighten a guy Q, which by a trip chain R pulls the hook from beneath the block K. The boat is then free to be lowered into the water. The boat is raised by hauling on the tackles E, the boat rising vertically until the block K touches the suspension rod G, whereupon the derrick B rises and the suspension hook H closes beneath the block K. The outer chock M^5 is then closed and held by the lever hook N and the pin *o* replaced.

THE CUNARD CO.'S "AQUITANIA."

MESSRS. John Brown & Co., Ltd., Clydebank, are steadily progressing with the completion and outfit of the great Cunarder *Aquitania*. An important stage was reached early in January when the last of the four huge funnels was finally placed and riveted into position. Extensive preparations had to be made for hoisting the funnel from the wharf and lowering it into position on the ship and several hundred men were employed in the operations, including a large body of engineers and riveters. The structure was lifted by the 150-ton crane, and to obtain the proper adjustment all the gangways had to be taken away and the ship moved about 16 ft. from the dock side. The diameter of the funnels fore and aft is 24 ft., the form being oval, and the height of funnel top above the keel is over 160 ft. Each of the four funnels, with its section of uptakes and boilers, weighs 1,500 tons, thus making 6,000 ons for the four; a fact which in itself indicates the weight and power of the propulsive machinery of the huge liner.

BOARD OF TRADE EXAMINATIONS.

DECEMBER 23rd, 1913.—LONDON.—*1st Class:* W. Devey, E. Franckeiss, J. Richardson, J. Wilson. *2nd Class:* C. Durant, L. Lawrence, D. Mayne, C. Miles, L. Peirce, H. Rahtkers.

ABERDEEN—*1st Class:* F. Fothergill, A. Ross. *2nd Class:* J. Barron, W. Haxton, J. Lamont, D. Main, G. Masson.

GLASGOW.—*1st Class:* W. McFarlane, J. O'Sullivan, J. Paterson. *2nd Class:* M. Campbell, G. Graham, D. Lockhead.

HULL.—*1st Class:* T. Kynman, F. Shepherdson. *2nd Class:* H. Anderson, T. Cordiner.

LIVERPOOL.—*1st Class:* S. De Alegria, S. Hudson, M. Price, H. Shimmin, G. Wilson. *2nd Class:* J. Clow, W. Clucas, W. Conners, A. Hill, D. M'Millan, J. Sturri.

NORTH SHIELDS.—*1st Class:* J. Wilson. *2nd Class:* A. Allan, G. Barron, J. Cannon, J. Gray, B. Hauff, M. Holm. F. Simpson, J. Storey, A. Young.

SUNDERLAND.—*1st Class:* A. Thomas. *2nd Class:* N. Bayles, A. Francis, W. Graham.

GREENOCK.—*1st Class:* G. Cuthbert, W. Lang. *2nd Class:* J. Trotter.

JANUARY 1st, 1914.—LONDON.—*1st Class:* G. Johnstone, F. Vreys, G. Young. *2nd Class:* R. Jarvis, S. Palmer, H. Wright.

LEITH.—*1st Class:* W. Chalmers, J. Morton. *2nd Class;* T. Furness, G. Gilroy, A. McAndrew, A. Malcolm, C. Pullar.

LIVERPOOL.—*2nd Class:* H. Clarke, N. Le Mare.

GLASGOW.—*1st Class:* T. Burness, A. Duncan, A. Grieve, W. Miller, J. Prentice, R. Renwick. *2nd Class:* J. Gibson, A. Gourlay, C. McLean, J. Richardson.

SOUTHAMPTON.—*2nd Class:* R. Evans, R. Hamilton.

JANUARY 8th, 1914.—LONDON.—*1st Class:* B. Cunningham, W. Edwards, R. Shaw. *2nd Class:* W. Hancock, T. Scott.

GLASGOW.—*1st Class:* J. McLay. *2nd Class:* A. Chalmers, R. Watson.

LIVERPOOL.—*1st Class:* J. Copeland. T. Jamieson, W. Kelly, R. Lazarus, W. Southwood. *2nd Class:* W. Radcliffe.

NORTH SHIELDS.—*1st Class:* E. Dent. *2nd Class:* E. Giles.

JANUARY 15th, 1914.—LONDON.—*1st Class:* H. Lowe. *2nd Class:* C. Clark, H. Warland.

DUNDEE.—*1st Class:* J. Mackay.

GREENOCK.—*1st Class:* F. Grierson. *2nd Class:* N. Buchanan, H. O'Sullivan, W. Owen.

HULL.—*1st Class:* C. Davison. *2nd Class:* F. Cox, F. Withington.

LIVERPOOL.—*1st Class:* J. Sinclair, E. Sparke. *2nd Class:* G. Gray, R. Jones, R. Thompson, J. Walsh, W. Westbury.

DUBLIN.—*1st Class:* E. Robinson. *2nd Class:* E. Foster.

NORTH SHIELDS.—*1st Class:* O. Bell, J. Foster, R. Pike. *2nd Class:* A. Watts.

CALENDARS AND MEMORANDUM BOOKS FOR 1914 have been received from the following firms:—THE UNITED STATES METALLIC PACKING CO., LTD., Bradford, an embossed ornamental calendar. MESSRS. ALFRED GRAHAM & CO., LTD., Crofton Park Road, London, S.E., manufacturers of loud-speaking naval telephones, a very useful combined desk diary and blotter. MESSRS. HAYWARD, TYLER & CO., LTD., pocket book and diary, including some useful tables as to friction in pipes, etc. WELIN DAVIT AND ENGINEERING CO., LTD., refills for the calendar stand issued by them. MESSRS. FRANK & SONS, marine photographers, South Shields, a nicely-produced calendar with illustrations of the S.S.'s *Visegrad* and *Colusa* and H.M.S. *Laertes*. THE SUBMARINE SIGNAL CO., calendar and booklet on submarine signalling. N.V. WERF DE NOORD, Alblasserdam. MESSRS. BENNETT, HOOSLEF & CO. and many others.

List of Vessels Launched in 1913.

(Received too late for Insertion in January issue.)

(Continued from page 239.)

Geo. Smith & Thomas, Ltd., Rye, Sussex, England.

Name of Vessel.	Material.	Flag.	Net Tns.	Gr. Tns.	I.H.P.
Keewaydin, sailing trawler	Wood	British	—	58	—
Sarah Colebrooke, aux. motor coasting barge	,,	,,	—	157	80/90b.h.p
Trevear, sailing trawler	,,	,,	—	60	—

Wm. White & Sons, Cowes, Isle of Wight.

M.Y. Yvonne, motor yacht	Wood	U.S.A.	18	26	40 b.h.p.
‡‡No. 321, steam launch	,,	British	39	—	77

No. 321 engined by same Company.

WORK ON HAND—

2 Adm. 60-ft. steam launches	Steel	—	— dis.	35	—
2 Adm. 30-ft. motor boats	—	—	—	—	—

‡‡ Compound Surface Condensing.

Vauxhall & West Hydraulic Engineering Co., Ltd., Luton, Beds.

‡‡Englishman, steam tug	—	—	—	—	290
‡‡Water boat	—	—	—	—	340
‡‡Adm. No. 191, launch	—	—	—	—	80
‡‡Adm. No. 192, launch	—	—	—	—	80
‡‡Evona, steam barge	—	—	—	—	290
‡‡Putney, steam launch	—	—	—	—	150
‡‡Assuit, steam launch	—	—	—	—	60
‡‡Dollman, stm. lch., tw. scr.	—	—	—	—	560
‡‡Ship, No. 256	—	—	—	—	200
				Total	2,050

Engines only by this Company.
‡‡ Compound Surface Condensing.

Wm. Hill & Sons, South Shields.

5 Motor launches	—	—	—	13	80

Vulcan A.B., Abo, Finland.

3 Boats	Steel	—	65	115	245

Engines by same Establishment.

George Niccol, Esq., Auckland, New Zealand.

Arrahna Pogue, 3-masted sail scow	Wood	British	99	186	—
† Wavina, steamer	,,	,,	175	285	44

WORK ON HAND—

m Pono, scow	Wood	British	—	—	—
Omaoa, steamer	,,	,,	—	—	—

† Triple Expansion. *m* Motor.

Altofner Schiffswerte der Donau Dampfschiff Gess, Budapest, Hungary.

* 3 Steam tugs	Steel	Austrian	144ea	275ea	350ea
† 1 Steam tug	,,	,,	250	460	950
* Harbour boat	,,	Hungarian	—	—	100
* Passenger steamer	,,	,,	—	—	100
24 Tugs	,,	Austrian	291	306	—

WORK ON HAND—

4 passenger steamers, 3 steam tugs, 8 motor boats. 12 tugs and 2 floating cranes.

All engines by same Establishment.
* Compound. † Triple Expansion.

THE ANNUAL PUBLICATIONS.

Who's Who, 1914. London: Soho Square. A. & C. Black. Price 15s., cloth.

THE 1914 edition (and 66th year of publication) finds this book with 2,314 pages, an increase of nearly 100 pages over the 1913 edition. It is a carefully compiled publication and it is difficult to imagine what one would now do without it. The biographies are arranged in alphabetical order, being thus easy of reference, and the information contained under each name is complete and accurate, no expense or trouble being spared to ensure this result. It is well up to the excellence of former editions and is well printed and bound.

Whitaker's Almanack for 1914. London: 12, Warwick Lane. Joseph Whitaker. Price 2s. 6d.

THIS indispensable book of reference, first published in 1868, is universally known. The present edition has been increased by 32 pages, owing to certain additions which it has been found necessary to include in the publication, *viz.*, references to the National Health Insurance Amendment Act, Aeronautics, Wireless Telegraphy, etc. It is chock full of the most varied information, of the greatest value for office and home. This year the page on hall marks on plate has been restored in response to the requests of many collectors. The 2/6 edition contains the supplement consisting of about 300 additional pages; without the supplement, "Whitaker" is sold at 1/-, and in its 500 pages is a veritable mine of information.

Pears' Shilling Cyclopædia. London: A. & F. Pears, Ltd.

THIS well-known annual numbers 1,070 pages and the present edition brings the total issue of the publication up to 1,000,000 copies. It is certainly a comprehensive and useful publication, and though space does not permit of the enumeration of the whole of its contents, some of the sections may be mentioned, *viz.*, an English dictionary, a cyclopædia of general information, dictionary of prominent people, a useful gazetteer of the world, office compendium, dictionaries of events, cooking, health, sport, etc. These sections show the varied nature of its contents. In addition we find a star chart of the Northern Hemisphere and a calendar for the years 1913 to 1929.

Rhodes' Shipping Annual and Directory of Passenger Steamers, 1914. London: George Philip & Son, Ltd. Price 2/6.

UNDER this title is now issued Rhodes' Directory of Passenger Steamers, which contains an alphabetical list of mercantile marine vessels. This obviously makes a very useful book of reference at a popular price. The particulars given of each vessel are very complete and the data carefully compiled. In this number we find articles on "Armed merchantmen," "The merchant service officer and his training," and a chapter for invalids on the benefit of a sea voyage. Reproduced in good style are photographs of the joint managers of the White Star Line and of a number of steamships.

The Navy League Annual, 1914. Edited by Alan H. Burgoyne. London: John Murray. Price 5/-.

THIS annual contains some nicely produced illustrations of British and foreign warships. The articles, which are a feature of the publication, are written by well-known people and are of an interesting and educative nature. They deal with "Submarines," "German naval progress," "The new French Navy," "Recent developments in shipbuilding," and "Engineering in the Navy and mercantile marine," by Mr. C. V. Mackrow; "Developments in battleship type," by Mr. Burgoyne. The aerial section has three chapters devoted to it. There are a number of other articles of interest. In addition the annual contains a great amount of tabular matter relating to British and foreign fleets, of considerable service to the naval student.

The Official Year Book of the Scientific and Learned Societies of Great Britain and Ireland, 1912-1913. London: Charles Griffin & Co., Ltd. Price 7/6.

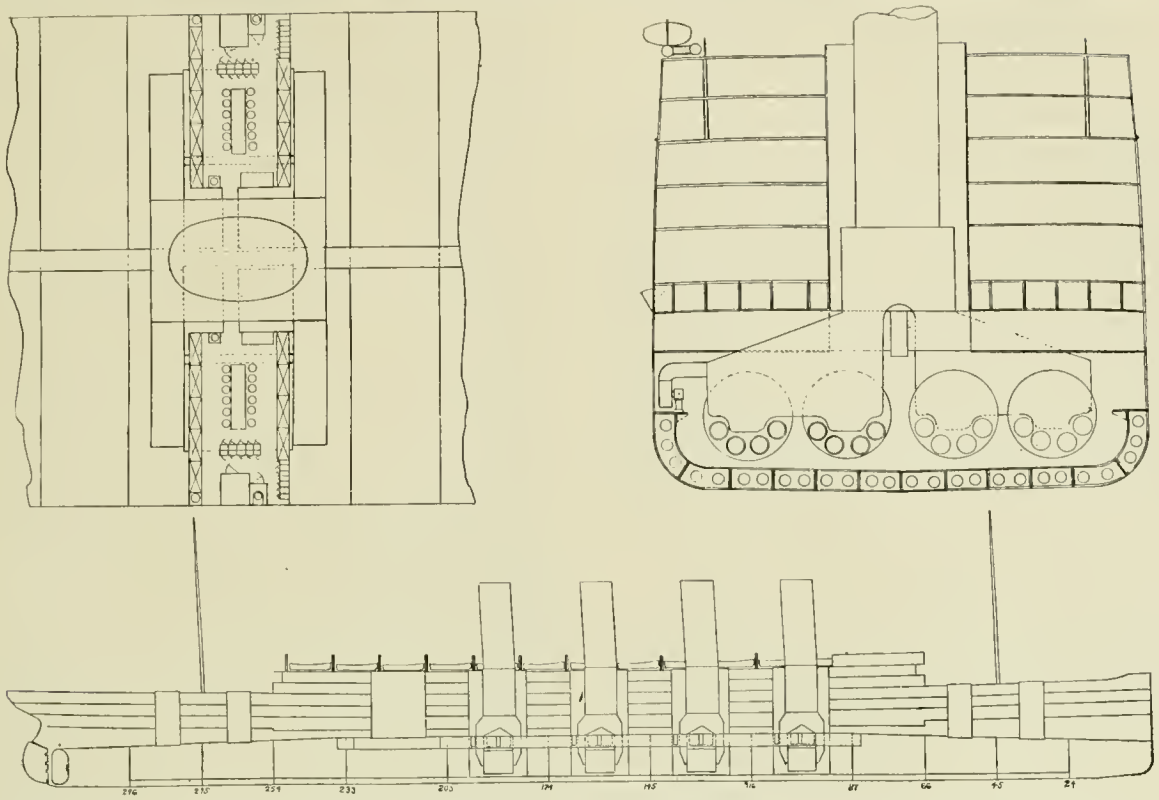
THIS book contains a list of all the learned societies, with the names of their officers, entrance and subscription fees, if any, and a short record of the work done by the society during the year. It follows, therefore, that a work of this description must be of considerable value for reference to the large class of people interested in scientific progress. The greatest possible care is taken in obtaining data of a correct nature, the particulars being obtained direct from the president or secretary of each institution or society. The publication is in its 30th annual issue and is well produced and printed.

Hazell's Annual for 1914. London: Hazell, Watson and Viney, Ltd. Price 3/6.

HAZELL'S Annual, edited by the Rev. T. A. Ingram, is now in its 29th year of issue, and well maintains the high standard of previous issues. It has a very wide scope, covering a host of subjects by far too numerous to set down here, but some idea of the extraordinary extent and variety of the information compressed into its 600 odd pages may be gathered from the fact that the index contains some 10,000 references. It includes sketches of the principal happenings in the British Dominions and foreign countries and an elaborate article on the Balkan War. It deals with Home Rule, Welsh Disestablishment, Medicine and Surgery, etc., etc. The section on engineering deals with the Panama Canal, prime movers, fuel, traction, the Chingford Reservoir, Indian irrigation, etc. Throughout the book space has been utilized in such a manner as to convey the maximum of information on every subject.

Molesworth's Pocket Book of Useful Formulæ and Memoranda. London: E. & F. N. Spon, Ltd., Price 5/-.

THIS is the 27th (jubilee) edition of "Molesworth." Fifty years have elapsed since the first edition was published, which consisted of 220 pages, the present edition containing 644 pages. It is not necessary for us to proclaim the usefulness of this publication, which is well known, and though there are now other books of a somewhat similar nature, "Molesworth," keeping pace with the advancement of engineering retains its hold, as an excellent engineering text-book, in the



This illustration has reference to a paper on the possibility of building an unsinkable ship read by Mr G. W. Dickie at the 21st General Meeting of the American Society of Naval Architects and Marine Engineers and which is the subject of a leader in this number, page 251.

favour and esteem of all engineers. The pocket book is produced in good style, with gilt edges and leather-bound.

Brown's Nautical Almanack, 1914. Glasgow: James Brown and Son. Price 1/-.

A VARIED amount of information is contained in this guide embracing tidal constants of all ports and harbours in the United Kingdom, Courses and Distances. Lights, beacons and buoys of the United Kingdom and abroad; systems of buoyage, port charges, etc. A legal section is embodied which gives some useful information and includes the regulations for preventing collisions at sea. The above does not in any way exhaust the contents of the publication, which should be found of considerable service to the mariner.

The Mechanical World Pocket Diary, 1914. Price 6d.

The Mechanical World Electrical Pocket Book, 1914. Price 6d. Manchester: Emmott & Co., Ltd.

THESE well-known pocket books have been considerably enlarged in the present editions. New and interesting features have been introduced and several sections rewritten and expanded. Tabular matter has been revised and both books brought thoroughly up-to-date. In the Pocket Diary, a lengthy section on milling and gear cutting has been introduced, also one on grinding. In the Electrical Pocket Book sections on telephones, the electrical equipment of ships, etc., have been added. The technical information given in these books for a merely nominal sum is really marvellous.

The Guide to South and East Africa, 1914. Published for the Union Castle Mail Steamship Co., Ltd., by Sampson, Low, Marston & Co., Ltd., London.

THE 20th edition of this guide, which is primarily issued for the use of tourists, sportsmen, invalids and settlers, is replete with information for those who, for one reason or another, voyage to Southern Africa. One chapter describes the voyage to South Africa and the ports of call and points out the sights of interest. The early history of South Africa is given and the railway systems and regulations, hotel accommodation, cost of living, education, climate, hospitals, banks, fauna, fruit-growing, farming, mining regulations, game laws, etc., all find a place in the volume. A gazetteer is included and a series of routes planned for the purpose of seeing the country. The East African section is arranged in the same manner as that dealing with South Africa, and is most comprehensive in its particulars. The publication is well supplied with coloured maps, plans and diagrams. It will be seen from the above that not only does the guide appeal to the traveller, but the stay-at-home interested in Greater Britain will find the information contained in its pages of a most instructive character. It is impossible to mention the whole of the contents here, but it is one of the most complete guides to the districts mentioned we have seen.

Reed's Sunderland Tide Tables, 1914. Sunderland: Thomas Reed & Co., Ltd. 6d.

Is a handy guide to the port of Sunderland, and a general tide table for England, Scotland, Ireland and the West Coast of Europe. The book is well arranged for easy reference.

P. & O. Diary and Almanack, 1914.

Is a nicely produced and convenient little book. In addition to the diary and almanack some maps, showing Continental communications, India, Australia, New Zealand, China and Japan are given. An excellent reproduction of the *Medina*, 12,500 tons, is given as the frontispiece.

Immingham and Grimsby Tide Tables, 1914, issued by the Great Central Railway, contains a great number of interesting facts and figures relating to the Immingham deep-water dock and Grimsby docks. All necessary information is included for ships using the ports. The book is issued in pocket size in leather covers.

Tide and Speed Tables, 1914, issued by Messrs. Alfred Graham & Co., Crofton Park, London, is a handy little book containing tide and distance tables, port charges, knot tabels electrical terms and a large amount of other useful general information.

LETTERS TO THE EDITOR.

(*Continued from page 269.*)

ROYAL NAVAL RESERVE.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Dear Sir,—You have been good enough to make references in your columns from time to time regarding the Royal Naval Reserve, and have pointed out the unfortunate position to which it has dropped in the estimation of those who are interested in the status of the marine engineer and the well-being of national defence. As one who has both these aspects in view, I commend to your readers a very careful consideration of the various issues which occur to the thoughtful mind in connection with the whole question. It is well known among engineers that the subject requires discussion, and that a representation should be made to the Admiralty is patent to many. The writer believes that there are several influential gentlemen who would take the matter up, if a well-known engineer, who has the instincts gained from sea experience to guide him, would but move to gather up the threads and formulate a scheme. I take the liberty of placing these few lines before you, and beg to subscribe myself

MULTA MOVENS ANIMO.

London, Jan. 23rd, 1914.

WORLD'S SHIPBUILDING OUTPUT.

THE accompanying tabular matter is taken from Lloyd's Register Annual Summary and shows the United Kingdom percentage of Merchant tonnage launched during the years 1911, 1912 and 1913. Vessels of 100 tons gross and upwards are included, and only vessels launched, whether completed or not during the year.

Where Built.	Description	1911. No.	1911. Tonnage.	1912. No.	1912. Tonnage.	1913. No.	1913. Tonnage.
United Kingdom	Merchant Vessels	772	1,803,844	712	1,738,514	688	1,932,153
	Warships ..	50	230,786	30	191,737	49	271,376
	Total ..	822	2,034,630	742	1,930,251	737	2,203,529
Other Countries.	Merchant Vessels	827	846,296	1,007	1,163,255	1,062	1,400,729
	Warships ..	119	538,083	144	342,892	131	405,533
	Total	946	1,384,379	1,151	1,506,147	1,193	1,806,262
WORLD'S OUTPUT.		1,768	3,419,009	1,893	3,436,398	1,930	4,009 791
United Kingdom Percentage of the Total Merchant Tonnage Launched			68		60		58

A CORRESPONDENT "ABERDONIAN" points out that the statement made in the paragraph "A record for the Forth," under Clyde Notes in the January issue—that the steamer *Eupion*, built last year by Messrs. Mackay Brothers, Alloa, is the first vessel constructed on the east coast of Scotland, on the Isherwood system of longitudinal framing—is incorrect. Our correspondent further says that "Messrs. Hall, Russell and Co., Ltd., Aberdeen, built, in 1910, the *Intaba*, a steamer 400 feet long, on the Isherwood system, and which was likewise the first passenger vessel constructed on this system." Our correspondent is right in correcting the statement. The *Intaba*, launched on September 6th, 1910, by Messrs, Hall, Russell & Co., Aberdeen, was, as he says, built on the Isherwood system of longitudinal framing, and therefore the first to be so constructed on the east coast of Scotland. She was also the first vessel constructed on this system to have a Board of Trade passenger certificate, though vessels on the system had been built previously by Messrs. Craggs and Sons, Ltd., Middlesbrough, and by Messrs. Wm. Hamilton and Co., of Port Glasgow, but these were purely cargo-carrying vessels. The *Intaba* was the largest steamer built at Aberdeen up till the time of her launch, and, curiously, the *Eupion*, built by Messrs. Mackay Brothers, at Alloa, is also up till now, as the note "A record for the Forth" stated, the largest built on the Forth.

A SCHOLARSHIP will be offered for competition among the graduates of the North-East Coast Institution of Engineers and Shipbuilders in September next. The examination will be held in Newcastle in the following subjects:—English, Mathematics, and Experimental Science. The scholarship is tenable for two years and is of the annual value of £50. Conditions for membership to the Graduate section may be obtained by applying to the Secretary, Bolbec Hall, Newcastle-on-Tyne.

INSTITUTE OF MARINE ENGINEERS.—The New Year's Eve social gathering for the Junior Section of the Institute of Marine Engineers has for some years been recognised as a pleasing event, and the large party which assembled at the Institute premises, 58, Romford-road, Stratford, on the last night of the year 1913, by kind invitation of Mr. and Mrs. James Adamson, found the occasion to be of an even more enjoyable character than in previous years. Every room in the building assumed, for the time being, a festive appearance suitable for the occasion. The dancing, which formed the main item of the entertainment, was excellently varied with games, songs and humorous recitations. Towards midnight, the party joined hands and welcomed the new year with the singing of "Auld lang syne," afterwards exchanging the time-honoured greetings. The opportunity was taken of expressing thanks, to the accompaniment of musical honours, to Mr. and Mrs. Adamson for their hospitality. This was the last gathering of the kind in the old premises (as the new building will be ready for occupation shortly), and it was fitting that the gathering was a highly successful one.

CORROSION OF IRON AND STEEL.*—Corrosion of iron and steel is a very complex matter to investigate; the metals are not simple materials; the atmosphere and natural waters with which the subject of corrosion is necessarily connected, varied considerably in their constitution; temperature has a bearing upon the subject: these and often many other factors needed to be taken into consideration to obtain a proper understanding of causes affecting corrosion. Some of the agencies which hastened the corrosion of iron and steel are:—(1) Alternate exposure to action of atmosphere and water. (2) The deposition of water in depressions, cracks and crevices. (3) Exposure to smoke, heated vapours, and acid gases. (4) Damp and vitiated atmosphere. (5) The accumulation of soot, dust, decaying matter, etc. (6) Dripping water, fresh or salt. (7) Stray electric currents, and electrolytic action. (8) Several different classes of iron and steel incorporated in one structure. (9) Inequalities of temperature. In some instances the agencies may be guarded against; but in many cases it is quite impossible to prevent them from being present; therefore, we must look to the improvement in the power of the metal to combat corrosion or to a suitable protective covering. Iron and steel, by their nature, are such that should we be able to incorporate with them some ingredient that would prevent corrosion, it would entirely alter their construction, and would probably render them useless for many of the purposes to which they are now put. The best methods to protect the surfaces and thus preserve the body of the metal were coating the surfaces (*a*) by a non-corrodible, or less corrodible metal, and by a metal that corroded and being electro-positive to iron would protect them; (*b*) by coating with porcelain enamels, which are afterwards stoved; (*c*) by an oxidizing process; (*d*) by Portland cement; (*e*) by paint, varnish or bituminous solutions or compositions. In conclusion, all structures should be composed of the same metal as far as other considerations will allow; surfaces should be even and free from depressions, cracks and crevices, wherein water can lodge; pockets that allowed of the collection of water should be avoided; all members should have free air circulation about them; provision should be made where necessary, for the drainage of water; joints, rivet heads, bolts and nuts should be given special attention to ensure exclusion of water, and all parts that are not easily visible should have careful inspection. When painting has to be done it is advisable that each coat should be of a different shade, in order to facilitate inspection, and to check the number of coats used. Above all, before a protective coating is applied the metal must be clean and dry, then a good material used, and the work must be properly carried out.

* Abstract from a paper read by Mr. F. Crosby-Jones before the Institute of Marine Engineers, January 19th.

The Marine Engineer

And Naval Architect.

LONDON, MARCH, 1914.

INTERNATIONAL CONFERENCE ON SAFETY OF LIFE AT SEA.

IN our February issue we gave a summary of the work of the Conference under the heads dealt with by the five sub-committees having the following gentlemen respectively as chairmen :—Safety of Navigation, under Sir Norman Hill; Safety of Construction, under Admiral Capps; Life-saving Appliances, under Sir John Biles; Mutual Acceptance of Certificates testifying to compliance with the requirements of the convention, under His Excellency Dr. von Koerner, while a general statement of the conclusions arrived at was made by Lord Mersey, the President of the Conference, who was specially qualified to act in this important matter. The full text of the Convention, which was signed by all the delegates on January 20th, 1914, with the exception of Mr. Furuseth, the representative of the American Seamen's Union (who left for home in a huff) has now been published as a parliamentary blue book and has been presented to Parliament. Before dealing with the subject in detail, it may be well to review the matter broadly. There is no doubt that the *Titanic* disaster was the determining factor in bringing up the subject in a way as to lift it from its abstract basis and put it on a concrete basis. The trend of international thought has been in the direction of the recognition of identity of interests in facilities for travel and communication, and the interchange of views by men of different nationalities has had the beneficial effect of removing suspicion and prejudice often based on ignorance and a want of a sense of proportion and perspective. We feel it is a matter for universal congratulation and satisfaction that a gathering of such diverse units should have appreciated the common bond of interest which belonged to them, that narrow limitations and special interests have been sunk or annihilated in a united effort to deal with matters on a broad and comprehensive basis. If the convention had done this only, it would have done a great work, but it has done more, it has formulated definite proposals as a framework on which a code of safety rules can be constructed, the details of which can be obtained on the combined experience of the various experts of each country to form what may be termed international regulations. Ships to which the Convention applies are, with certain exceptions, merchant ships of the States of the High Contracting Parties which are mechanically propelled, carrying more than twelve passengers, proceeding from a port of one State to a port situated outside that State, or conversely. Ports in any colony, possession or protectorate of a state are considered to be ports outside the States of the High Contracting Parties. Persons who are on board by reason of *force majeure* or in consequence of the obligation laid upon the masters to carry shipwrecked or other persons, are not deemed to be passengers. Ships making voyages specified in a schedule to be communicated to the British Government at the time of ratifying the Convention are excepted from the Convention, except in certain cases provided for, but no schedule can include voyages in the course of which ships go more than 200 sea miles from the nearest coast. Each party has the right to modification of the schedule on notice, and can claim from another State the benefit of the Convention for all of its own ships engaged in any voyage on its own schedule, but under the obligations prescribed, if such are not unnecessary or unreasonable. No ship, not subject to the Convention at the time of its departure, can be subjected to the Convention in the course of its voyage, if stress of weather or any other course of *force majeure* compels it to take refuge in a port of one of the states. We think no objection can be taken to the provisions set out as to applicability of the Convention. Dealing with the safety of navigation, the transmission of information as to ice and derelicts is obligatory and may be sent from ship to ship or to the Hydrographic Office at Washington, either in clear and by means of abbreviations set out in a special code. This code has been worked out under three headings, *viz.*, day of the month, time of observation and nature of ice or derelict observed, and full information has been given as to its use. The transmission of information relating to the weather is optional and may be made by use of another code which, by the way, may be modified at any time by the Meteorological Congress. The information is grouped under four heads, *viz.*, (1) day of the month and position of the ship when transmitting the message; (2) wind direction and force, set and velocity of current, weather and state of the sky; (3) the barometric height and air temperature; (4) the barometric tendency and sea surface temperature. The information under the three last heads is to be relative to a given time, *viz.*, 8-0 a.m. at the 75th meridian of west longitude, on which Washington is situated. We think it is a wise provision that the U.S.A. Government is to take charge of this branch, owing to the excellent work that the Hydrographic Department at Washington has performed in this direction, probably better than any similar department in the other States. The utility of wireless telegraphy will be widely extended on a definite and comprehensive basis under the scheme. The removal of derelicts in the North Atlantic, as well as a service of ice patrol for observation and study of ice conditions, is to be effected at the expense of the high contracting parties in the following percentage: Great Britain, 30; France, Germany, and the U.S. of America, 15 each; Belgium, Italy and The Netherlands, 4 each; Norway, 3; and Austria-Hungary, Canada, Denmark, Russia and Sweden, 2 each. This work is to be handed over to the U.S.A. Government to carry out. Although Great Britain is to bear the largest proportion of the cost, no exception can be taken to this owing to the extent of the particular interests we have in the matter. Article 9 lays it down definitely that the master of every ship fitted with a radio-telegraphic installation, on becoming aware of the existence of an imminent and serious danger to navigation shall report it immediately in the manner prescribed above; while article 10 lays it down that when ice is reported on or near his course, the master of every ship is bound to proceed at night at a moderate speed or to alter his course so as to go well clear of the danger zone. This

is a distinct registration of the opinion brought out so forcibly in the *Titanic* enquiry. The use of the international distress signals are prohibited on every ship for purposes other than that of distress signals, and the use of private signals which are liable to confuse in a similar way are prohibited also. The selection of the routes is left to the steamship companies, but it is to be incumbent on the companies to give public notice of the regular routes they propose their vessels shall follow and of any change which they may make in them. Efforts are to be made by the parties to the Convention to obtain from Governments who are not parties, an agreement as to the revision of the International Regulations for preventing collisions at sea in the matters of signals and lights carried by vessels. Further efforts are to be made to have measures adopted whereby the ships coming under the provisions of the Convention shall be sufficiently and efficiently manned. We do not think there is any ground for criticism, dealing with the provisions in the wide sense, but no doubt time and experience may suggest certain modifications to meet circumstances which are not apparent now. Dealing now with the subject of construction—this has been divided into two sections, one dealing with "new ships," the other with existing ships. The former are those the keels of which are laid after July 1st, 1915. The new regulations are applicable to "new ships" only, and "existing ships" are left to be dealt with by the administration of the State to which the ship belongs, with a view to improvements for providing increased safety where practical and reasonable. The first regulation for "new ships" provides for efficient subdivision on a minimum basis laid down by the Convention, and the degree of safety varies in a regular and continuous manner with the length of the vessel and with a certain criterion of service. The requirements involve the highest degree of safety corresponding with the ships of greatest length primarily engaged in the carriage of passengers. The permissible length of compartments is dealt with on the basis of the floodable length, and rules as to certain special cases are provided. A certificate of special safety above the standard set by the Convention can be granted by any State. Special provisions are made as to the fitting of ships with forward and after-peak bulkheads, and bulkheads at the extremities of the machinery space, fire-proof bulkheads, means of escape from the various watertight compartments, and the construction and testing of watertight bulkheads. The number of openings in watertight bulkheads are to be reduced to a minimum, compatible with the design and proper working of the ship, and side scuttles and other openings in the side of the ship and the inboard openings of discharges through the shell must be provided with means of closing them and be arranged in such a manner as to prevent, as far as possible, the accidental admission of water into the ship. Special provision is made to ensure the strength and water-tightness of watertight decks, trunks and ventilators. The periodic inspection of watertight doors, and drills for these operations are to be carried out during the voyage, and entries in the log book be made as to these. The measurement extent of the longitudinal and transverse double bottom is defined relative to the length of the ship, and provision is made as to power for going astern, and the fitting of auxiliary steering apparatus. It will be recognised that on reviewing these various provisions relative to ship structure, difficulties must have been experienced in bringing the regulations of various States into line, and therefore each State is to undertake to press forward the study of the criterion of service previously referred to, and to send their conclusions to the British Government, which is invited to collate and distribute the matter. Where agreed upon each State is to make regulations to have the same effect as if they were prescribed in the present Convention. The matters particularly referred to include:—(1) The fitting of longitudinal watertight bulkheads, double skins and watertight decks and flats, and the question whether there may be allowed any increase in the length of transverse watertight compartments, in way of which such longitudinal sub-division is affected, and if so, to what extent. (2) The method of subdivision for obtaining the highest practicable degree of safety to be applied to ships of shorter length than those already covered. (3) The results of experiments in regard to the proper margin of resistance above the pressure which the watertight bulkheads are required to be capable of supporting, according to the present regulations. In dealing with radio-telegraphy, all merchant ships belonging to the contracting States, whether propelled by machinery or sails, and whether they carry passengers or not, shall, when engaged on voyages as previously defined, be fitted with an installation if they have on board fifty or more persons in all. Certain exempting circumstances are defined where the installation is unreasonable or unnecessary. First-class ships are defined, and must have a continuous service, while second-class ships are to have a service of limited duration, but must, during navigation, maintain a continuous watch for at least seven hours a day and a watch of ten minutes at the beginning of every other hour. Ships which have no fixed periods of service are placed in the third class. The power of each installation is to be capable of transmitting clearly perceptible signals from ship to ship over a range of at least 100 sea miles by day under normal conditions and circumstances, and an emergency installation is to be provided, every part of which is to be placed in a position of greatest safety, for instance, in its entirety in the upper part of the ship, as high as practically possible. An independent source of energy is to be included in the emergency installation, capable of being put into operation rapidly and of working for at least six hours with a minimum range of eighty sea miles for ships in the first class and fifty sea miles for ships in the two other classes. If the normal installation has a range of at least 100 sea miles and complies with the other conditions, an emergency installation is not required. It may be assumed that these regulations will be considered to fairly meet the case at present, with the exception of the watch regulations of the second-class ships. Now as to life-saving appliances and fire protection, the definition of new ships is slightly different from the foregoing, *viz.*, these are those of which the keels are laid after 31st December, 1914. Each ship must carry boats and pontoon rafts capable of accommodating all persons on board at any moment of its voyage. Boats and pontoon rafts are to be of standard types and of definite strength, but certain provision is made for alternative types. The embarkation of the

passengers in the boats and rafts is to be dealt with under suitable arrangements, and the capacity and equipment are dealt with in the regulations very thoroughly. The other provisions include the storage of boats, the number and strength of davits, the handling of boats, operating of davits and the use of alternative appliances to davits, and the provision of life jackets and lifebuoys; means of ingress and egress to the different compartments and decks, as well as provision for emergency lighting for the required safety in different parts of both new and existing ships, particularly on decks on which the lifeboats are stored. On new ships there must be a self-contained source, capable of supplying, where necessary, this safety lighting system and placed in the upper parts of the ship as high as possible. Certificated lifeboat-men are to be carried to man the boats, with a certain minimum number defined in the regulations. It is provided that goods shall not be carried either as cargo or ballast, which, by reason of their nature, quantity or mode of storage, either singly or collectively, are likely to endanger the lives of the passengers or the ship, but this does not apply to ships' distress signals or to naval or military stores for the service of the State, under authorised conditions. The work before the naval architects in dealing with the new provisions in the near future will be considerable in extent, assuming, of course, that they will receive the ratification of the various States involved in the terms of the Convention. We cannot hope that the whole will be capable of enforcement without some sense of hardship or irritation on the part of those who will have to foot the bill for the next requirement, but the work has begun well and should be carried on with the same sense of goodwill, a sound judgment which has characterised the work of the delegates.

MOTOR BOAT AND YACHT RACES AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.—In April of next year Sir Thomas Lipton will compete with the yacht owners of America and the principal Continental nations on a course to be laid out adjacent to the grounds of the Panama-Pacific International Exposition at San Francisco in 1915, and the race will be a feature of the Exhibition. Sir Thomas is confident that this time he will be able to win back Great Britain's supremacy in one of its favourite sports, and is sparing no expense to have the yacht the best that may be built. England's best boat builders and designers will have a try at the plans and the result should justify Sir Thomas' expectations. A feature of the Exhibition at San Francisco will be the motor boat races, which will be over many varied types of courses. The most interesting from an endurance standpoint will be the one from Chicago through the drainage canal to the Mississippi River, to the Gulf of Mexico and thence to Colon, through the completed Panama Canal, north on the Pacific coast to San Francisco. Another, equally difficult, is laid from Sandy Hook through the Panama Canal to San Francisco. This race will be known as the Canal Marathon, and a number of boat owners have already expressed their desire to enter the race. It is believed, according to despatches from San Francisco, that hydro-aeroplanes will be entered in these races. As these craft have never been looked upon as the type needed for endurance races, speedy though they unquestionably are, the result of the race will be watched with interest throughout the sporting world. As the end of the course lies before the Exhibition grounds a special ceremony is to be held upon the arrival of the winning boat in San Francisco, and the freedom of the city will be offered to the gentleman first successful in accomplishing the arduous feat.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The P. & O. Company.

THE most recently issued list of the Fleet of the great company of Leadenhall Street contains some really interesting details. The total tonnage shown amounts to 546,000 tons gross register. This is contained in some ninety-eight bottoms. But of these, twenty-eight craft, totalling 3,448 tons, really consist of tugs and tenders, of which the biggest is the 1,061-ton *Harlington*, whose occupation is the carriage of cargo and coal between ports on the North-east Coast of England and the Thames. The next most important of these vessels in point of size is the *Dewan* of 282 tons, stationed at Bombay, whilst there are launches down to a mere 8 tons register with engines of 3 h.p. nominal. The ocean-going fleet—after deducting these little craft—is of 542,553 tons and of 571,000 h.p. Eight of these, however, are either building or completing. They include the first-class mail steamer *Kaiser I. Hind* of 11,400, tons gross register, six other "K's" of 9,000 tons and 9,000 h.p. each, and the branch line steamer *Borda* of 11,100 tons and 9,000 h.p. for the service to the Australian Commonwealth *via* the Cape. When this last-named ship is completed, the branch line will have no less than eight steamships allotted to it. Of these but one, the *Vulcannia*, is a single-screw, whilst five vessels of over 11,000 tons each, will have been added since the Company took over the business from Mr. Wilhelm Lund. For the P. & O. business proper there were fifty-five vessels of 402,038 tons, of which no less than thirty-eight are twin screws. There are ten mail steamers of the "M" class, of which the *Medina*, in which the King and Queen travelled when they went to the Delhi Durbar, is an example, and eight of the smaller "N" class, all added within a comparatively few years. Meanwhile of the seventeen single-screw vessels, still shown in the list, rapid disposal is being made, a whole class, comprising the *Palawan Borneo*, *Sunda* and *Sumatra*, of about 4,500 tons and 3,500 i.h.p., having been sold since the list was printed. These vessels were built in the year 1895 on the Clyde by Messrs. Caird's and A. Stephens & Co. They are gone to Far Eastern buyers, some being taken by Japanese and others by Bombay owners, and their places are being taken by the larger and more powerful vessels which are rapidly coming forward.

The Atlantic Rate War

owed its origin to the strained relations between the two great German companies, who were dissatisfied with the proportions of the traffic allotted to them in view of the large additions they have made, and are making, to the tonnage they employ in these important services. Though no doubt these reasons had a great deal to do with the matter, there seem also to have been other causes which had some weight in bringing matters to a state of rupture. The annual conference between the various lines, parties to the Atlantic pool, should in due course have been held in November, 1913. But from various causes the meeting was postponed till January, 1914, when it assembled on Wednesday, the 21st, at Paris. The proceedings were brief, though somewhat momentous. The Hamburg Company was not represented. But it formulated a demand for a larger share of the traffic, in view of the fact that it will in a short time have three 50,000-ton vessels engaged in the New York trade. It was not found possible to meet these demands, and it was resolved that as and from the 31st January, the pool should be broken up, though the offices were to be continued for statistical purposes. The Continental lines, other than the Hamburg-American Co., seem to have arrived at an arrangement to continue the pool amongst themselves, whilst the representatives of the British lines came straight home and held a meeting of their own at Liverpool on the 30th January under the presidency of Mr. A. A. Booth, the chairman of the Cunard Company. Their object is, of course, to avoid a rate-cutting war, which can only be disastrous to everybody concerned. Meanwhile, the Hamburg line began a number of moves, some of which may be connected with the trouble between itself and its Bremen rival. One of these was the institution of a new service to the Persian Gulf in conjunction with the Hall Line of Liverpool, whose

steamers indeed have already made some voyages in the trade. The two companies will send steamers alternately and will serve ports of shipment as well on the Western shores of Europe as Glasgow, Newport, Monmouthshire and Manchester. At present the despatches will be made monthly. Then a new line from New York to the Eastern Mediterranean and Black Sea ports is announced by the Hamburg Company, the first steamer to be despatched being the *Prinz Adalbert*, of 6,000 tons, which is scheduled to leave New York on the 13th April, sailings to be maintained thereafter at fortnightly intervals in the busy season, but being reduced to monthly despatches during the off months. But perhaps the most significant announcement was that made on the 30th January in regard to the Canadian business. Hitherto Canada has been served by the Hamburg Company, the N.D. Lloyd and the Holland-American Line in conjunction. Now it appeared that the Hamburg Company was about to open an independent office in Montreal and to arrange for the carriage of steerage passengers and the maintenance of a weekly passenger service of its own. This would be a new departure altogether, as heretofore the joint service has been a goods line only, and the move would be one which would be calculated to strike a blow at the business of the Canadian Pacific Company, whose action in leaving the Conference some time ago may be said to a certain extent to have precipitated the present conflict. But at the same time the move in question seems in some way to have made for peace. For the Holland-American Line is one in which other companies, notably the Hamburg Company, the Lloyd and the International Mercantile Marine Company, have substantial interests. The Holland Company therefore took the opportunity to use its influence towards reconciliation between the two German companies—a step in which it had the moral support, at least, of all the British lines, since at the Liverpool meeting the idea of a rate war had been strongly deprecated. Nevertheless, on the 1st February, the cuts promised in the steerage rates came into force, and the westward passage rate was lowered some four dollars. Then came the announcement of the results of the working of the Hamburg Company during 1913. The statement was considered unsatisfactory from the point of view of peace, for never has the Company done so well. Its profit amounts to over three millions sterling—a much higher figure than any previously recorded. On the other hand, it should not be forgotten that it has to pay its dividend on an increased capital. Nevertheless it only maintains the 10 per cent. dividend paid a year ago, thus disappointing those who had calculated on an 11 per cent. distribution, which it might easily have effected, for it carries 2¾ millions sterling to reserve, as against but £1,900,000 a year ago. Still it puts down its liquid resources at under 2½ millions sterling against over 3¾ millions at the end of 1912. Moreover, this 2½ millions includes a sum of 1½ millions received on account of the recent new issue of capital. It would appear, therefore, either that a great part of the reserve has gone towards the payments for new tonnage or it has been put into some form which makes it readily available for purposes of a rate war. The counter move of the Bremen Line seems to have been—besides lowering the rates to the same figure as its rival—to open a special office in Hamburg which is to deal with incoming cargo-traffic as well as with tug traffic between the rivers Weser and Elbe. Then came an agreement suspending hostilities till the end of February, and finally the meeting of the chiefs of the belligerent companies at Vienna, when an agreement was come to which binds the two lines for a period of fifteen years in regard to the Austro-Hungarian emigration traffic. Steps are to be taken to avoid the possibility of the escape to America of any Austrian subjects liable to military service, a thing which in the past seems to have aroused considerable apprehension in the minds of the military authorities in the dual monarchy owing to the volume and character of emigration from their territories in former years. One can hardly imagine that Herr Ballin and Herr Heinecke could have met and arranged one so important a matter without putting things in train for the settlement of other disputes and the avoidance of a costly and indeed suicidal war.

The Australian Services.

Whilst there is talk of the institution of a bi-weekly mail to India, it would appear that there may in the immediate future be a reduction in the number of mail services to Australia. The British weekly mails so regularly carried by the P. & O. and Orient Companies are not of course, threatened. But the Nord Deutscher Lloyd find that the continuance of its mail service on the best terms now available for the performance of the contract with the Imperial Post Office does not afford it sufficient inducement to warrant its continuance of the sailings, whilst at the same time the Messageries Maritimes, which has for so long maintained the French mail service to southern ports, has entered into an agreement with its Government to substitute a monthly service of intermediate steamers for the old mail service. The ports of call have hitherto been Bombay, thence to Colombo, Fremantle and ports to Sydney, whence a run is made to the important French colony of New Caledonia, and so back to Sydney and home. Under the new arrangement the itinerary, after leaving Colombo, will be altered. The steamers will proceed *via* Singapore and the Torres Straits to Brisbane and Sydney, calling *en route* at the New Hebrides and New Caledonia.

Two disasters to famous ships.

Both have been off the American coast. First was the sinking off Cape Charles of the Old Dominion Line's steamship *Monroe* by collision in a fog with the Baltimore steamship *Nantucket*, whereby some forty-one lives were lost. In this disaster wireless again played a useful part, and once again a wireless operator displayed marked heroism, surrendering his lifebelt to a woman at the last moment and being amongst the lost, whilst the woman who took the belt was saved. The *Monroe* was a vessel some ten years old, built at Newport News and having a gross register of about 4,500 tons.

The other disaster was the stranding near Barranquilla of the famous steam yacht *Warrior*, owned by the American millionaire Mr. F. W. Vanderbilt. No lives were lost by the casualty, though the passengers, several Englishmen and women of high rank, had a rather unpleasant experience whilst they were waiting to be taken off. The first steamer which came up was the United Fruit Co.'s s.s. *Frutera*. She lost most of, if not all, her boats in the attempt at the rescue, but by her wireless she called up the same company's s.s. *Almirante*, which effected the rescue after the sea had somewhat subsided, and eventually took the owners and their guests to New York. The *Warrior* cost about £100,000. She is a twin-screw steel yacht of some 1,266 tons (Thames yacht measurement), and of 396 tons nett register, built in 1904. It appears unlikely that the vessel will be refloated at present, but her eventual salvage seems to be expected, as the rate for re-insurance remains at about 30 guineas per cent.

The Cunard Company

has, by arrangement with the Postmaster-General, definitely abandoned the call at Queenstown for the westward mails. It will be remembered that some little time ago it was found impracticable to get the bigger steamers into Queenstown in certain states of the weather and of the tide, whilst the weather conditions which made the entry inadvisable also prevented the possibility of transferring mails and passengers from tender to ship in the open sea. So by the larger vessels it was notified that no passengers would be embarked at the Irish port, whilst at the same time it was explained that there was no certainty that the mails could be picked up there, and Irish correspondents were advised to post their letters in time to allow of their being sent to Liverpool for embarkation. An outcry was, of course, made at this alleged neglect of Irish interests, but the Board of Trade, the Admiralty and the Post Office all agreeing that the port was not safe under certain conditions for vessels of the largest class, there was nothing to be said, as the authorities could not insist on the Cunard Company risking the ships and the valuable lives and property committed to their charge. On the 1st February the weather was such that the outward-bound *Lusitania* failed to pick up the mails at Queenstown and the bags intended for her—some 686 in number had to wait four days and were eventually taken on board by the White Star Liner *Oceanic*. The vessel sailing on the 15th February also failed to pick up her mails. Meanwhile came the announcement that the Cunard call at Queenstown on Sunday morning would be altogether abandoned. The mail which has hitherto closed at the London General

Post Office at 8.45 a.m. on Saturday morning will now close at midnight on Friday. The Cunard "special" hitherto leaving Euston at noon on Saturday will be advanced so as to start at 9.30 a.m., and the sailing from the landing stage at Liverpool will be made at 2.30 p.m. instead of at 5 p.m. Thus under ordinary circumstances the mail steamer will pass Queenstown before midnight on Saturday, and nearly half a day will be saved in the transit. The loss of time by closing in London at midnight on Friday, instead of at 8.45 a.m. on Saturday, is more apparent than real, as few persons write letters in the small hours of that day, which is more and more becoming a weekly holiday. Though Ireland naturally protests the Post Office is fully justified in the action it has taken.

A sad accident took place in the engine-room of the *Mauretania* on Monday, the 26th January. The vessel was in dock undergoing her annual overhaul and her turbines were opened up, a gang of men being engaged in brazing blades and using compressed coal-gas for the purpose. Suddenly a cylinder, in which this gas was stored under high pressure, exploded, killing four men and seriously injuring others. The evidence adduced at the inquest showed that a curious combination of coincidences had rendered nugatory the elaborate precautions taken to avoid the possibility of accident in connection with the use of such highly charged cylinders. The makers of the gas purveyed two classes of cylinder, one for the storage of oxygen, the other for use with coal-gas. One set were painted red, and one set black to avoid possibility of confusion. To add another safeguard, one set had a right-handed screw, the other a left-handed for the fitting of the cock by which the contents were passed out. It appeared that in this case a customer had changed the colour of an oxygen cylinder, and that thus it had come to be filled with coal-gas, whilst probably retaining a small quantity of the last charge of oxygen. This caused a dangerous combination, whilst the ingenuity of those who fitted a device to overcome the difficulty occasioned by the presence of an inverted thread completed the destruction of the safeguards. It is extremely unlikely that such an accident can ever recur. But its sad effects remain. The ship was only slightly injured, but it became desirable for her to miss her next appointed sailing.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

THE agitation against the new form to be signed before men can be placed on the established list has called forth a lucid explanatory statement from Dr. Macnamara, the Financial Secretary of the Admiralty, which has considerably cleared the air. Replying to the question whether the power taken to transfer men from one yard to another would be used to send men to a private yard while a dispute existed, Dr. Macnamara, while disclaiming responsibility for anything future Governments might do, said that under no circumstances had the present authorities such a plan in contemplation. "It was merely a question," he said, "of transfer from one Royal yard to another, and I repeat we should only do that by seeking volunteers, whom we should most probably get." The expenses of men so transferred are to be paid by Government, and the Secretary added, "We should not in any circumstances use this power for the purpose of breaking a strike in some private yard." Liability to be transferred to a foreign yard, which also is taken by signatories of the new form, merely places the men on the same footing as the established dockyard officials. Dr. Macnamara's statement also dealt with overtime and other questions, presenting the Admiralty view in a manner which seems to have convinced many of the men that, as he put it, all those dark designs on Trade Unionism spoken of at the recent meeting and elsewhere during the agitation "exist only in the minds of those who mysteriously hint at them." As to the origin of the form which caused all the discussion, the Secretary explained that, simultaneously with the decision to increase the numbers of established workmen at each of the yards—in response to numerous petitions of the men—it was thought advisable to bring together the various rules and regulations scattered throughout the dockyard regulations, the Superannuation Acts, and the like, so that each candidate for establishment might become fully acquainted with his position. That the Admiralty action was inspired solely by a desire to promote the efficiency of the public yards seems now to be more generally understood. There has been a considerable exodus of warships from the port during the past month in connection with the departure of the squadrons for exercises in the Atlantic. The battleships *King George V.*, *Hercules*, *St. Vincent*, *Dreadnought* and *Britannia*, and the armoured cruiser *Achilles*, are among the vessels which have left. There are now in dock or in harbour the battleships *Superb*, *Monarch* and *Hindustan*, from the First, Second and Third Battle Squadrons respectively, and a few smaller vessels. Of ships out of commission undergoing long refits, the *Invincible* has had her eight barbette guns landed in connection with the replacement of electric by hydraulic gear for training and firing purposes. No less than £114,000 is being spent upon this alteration. The Admiralty commendation of the services rendered by all concerned at the recent fire was very gratifying. The ruined buildings have since been demolished, but nothing is known yet about the erection of a new tower. An interesting presentation has been made to the yard by Castle's Shipbreaking Company in the shape of the figure-head of the *Royal Albert*, line-of-battleship, built in 1854, and at whose launch Queen Victoria performed the naming ceremony. We already had in the Dockyard Museum the mallet and chisel used by her Majesty on that occasion.

Devonport Dockyard.

Despite much hard work on the part of officers and men, and the assistance of the salvage lighter "No. 94" from Sheerness, submarine *A7* remains unsalved at the moment of writing, although nearly five weeks have elapsed since she sank. The present writer pointed out last month that no submarine had ever been raised from such a depth as 23 fathoms, in which the boat now lies, and it seems doubtful if success would have attended the operations even had the weather been favourable. The difficulty is that the boat lies embedded in a 20-ft. hole in the mud. It seems doubtful if *A7* will ever come up. Probably but for the fact that the cause of the disaster is still a mystery the Admiralty would have abandoned the hull some days ago. Steady progress is being made in the dockyard, both as regards new construction and refitting work. The *Marlborough* has been coaled to begin her trials, and was to have left on February 9th, but the date was postponed for a week. This makes the *Marlborough* three months behind her sister, the *Iron Duke*, at Portsmouth, which began trials in November. The *Warspite*, completing afloat, continues to employ a large number of hands, and a good beginning has been made with the *Royal Oak* on the stocks. A beginning has now been made with the light cruiser *Cleopatra*. This was one of the five light cruisers in the last Navy Estimates which were to have been built by contract, but two of which the Admiralty decided to have built in the public yards instead. A sum of just under £25,000 was voted for the *Cleopatra* in the Estimates. News regarding her design is scarce, but it is not anticipated that there will be any marked difference as compared with the *Aurora*, which is rapidly approaching completion and may be ready to take part in the summer manœuvres. The chief feature about these light cruisers is their high speed, for they are expected to do over 30 knots, and the use of oil only in their furnaces. There are sixteen building at all the yards, in addition to those which are expected to be included in the programme of the forthcoming Navy Estimates. Refitting work continues to be plentiful. The *New Zealand*, having been overhauled after her cruise round the world, left on February 5th to join her squadron at Portland, and on the same day the *Thunderer* arrived from the Spanish coast to take her place. We have also the *Temeraire*, battleship, and *Devonshire*, cruiser, in hand, though both should be ready to rejoin their respective squadrons by the time these lines appear. An unexpected arrival for refit was the battleship *Centurion*, which only left on January 24th for Vigo to join the flag, and was back again on February 11th, having developed defects. In the labour world, things are more tranquil than last month, owing no doubt to the Admiralty's reply to the representations in

regard to the new establishment form, which Dr. Macnamara assures the workmen was drawn up solely in the national interest and not with a view to injuring Trade Union progress by transferring men to break strikes at other yards and the like. A good deal turned on the definition of the term "national emergency," when men might be shifted. Dr. Macnamara explained its two-fold character in the shape of (1) a general emergency, such as war; and (2) a particular emergency, such as the necessity of raising the submarine recently lost by equipment from another yard. On this and the other points of controversy there is a better feeling of understanding now apparent.

Chatham Dockyard.

In view of the interest created by the delivery of the first two submarines for the Royal Australian Navy, and the attention directed to their large size and power, it may not be out of place to remind readers of these notes that six submarines of the same type have been or are being built at Chatham. These are *E1*, and *E2*, now in service at Portsmouth; *E7* and *E8*, launched in October last and now nearing completion; and *E12* and *E13*, building on the stocks. With the ten others of the "E" class constructed by the Vickers firm at Barrow, these boats make a remarkable addition to the power of the British submarine flotilla, each one being 176 ft. long, 22½ ft. in beam, and of 800 tons displacement. They are twin-screw boats, driven on the surface by two heavy oil engines, each of 800 horse-power, and below water by electric motors supplied with power by a dynamo. The circumstance that the Australian vessels just delivered have twenty-nine officers and men each indicates the great advance over the early submarines, with little more than a third of that number in their crews. Turning to the work of the yard, there is no lessening of activity, although several vessels have gone to sea during the past month on being passed out of dockyard hands. The *Hibernia* completed her refit on January 28th, and has left to resume duty as flagship in the Third Battle Squadron. In her place, we have the cruiser *Natal*, which arrived on January 27th. The *Russell*, battleship, *Aboukir*, cruiser, *Cyclops*, repair ship, *St. George* and *Hecla*, depot ships, *Vulcan*, submarine depot ship, and *Andromache*, minelayer, are among the other ships which have been in the dockyard during the past few weeks for overhaul. By the time these lines appear, the *Dominion* will have arrived for a similar purpose, after her visit to Cherbourg with the Third Battle Squadron. There is cause for satisfaction at the number of apprentices which the Admiralty have decided to enter this year. It is evidently realized that as a general rule men trained in the Government yards are better fitted for warship work than those who have served their apprenticeship elsewhere, and therefore it would be detrimental to the public interest to make any serious reduction in the entries. Chatham has cause to be proud of the selection of one of its constructive officers to be chief constructor of the Australian Dockyard at Cockatoo Island, Sydney. Mr. J. J. King Salter, who has left for the Commonwealth to take up this duty, had been at Chatham since July, 1907, when he was transferred from the yard at the Cape of Good Hope. He carries away with him the good wishes of all with whom he has been associated here.

Sheerness Dockyard.

On February 7th and 8th another visit to the Medway naval establishments was made by Mr. Churchill, the First Lord, but it caused no surprise that the air station on the Isle of Grain and the flying school at Eastchurch possessed the greatest attraction for him, and that his stay in the dockyard was a very short one. Mr. Churchill made his tenth aeroplane flight on this occasion in No. 76 machine, piloted by Lieutenant Seddon, who commands the Isle of Grain air station. No doubt the First Lord complimented Lieutenant Seddon on his splendid flight to Plymouth a few days before, when this officer flew from the Medway to Plymouth in less than six hours, with only one stop at Calshot for lunch. Although the immediate cause of the flight, to search for submarine *A7*, produced no subsequent effect, owing to the hull being recovered just before the seaplane arrived, Lieutenant Seddon gave a striking demonstration, by his journey down the coast at the rate of sixty miles an hour, of the great value of aircraft for scouting and intelligence work. Apart from the coming and going of destroyers and other small craft, there has not been much activity in the port during the past month. The *Indomitable* arrived on January 28th from the Mediterranean, but only to pay off and recommission, and left after a fortnight's stay. On February 6th the light cruiser *Falmouth* returned after being refitted at Chatham, making the Nore Division of the Second and Third Fleets complete except for the *Aboukir* and *Russell*, the sixteen vessels here including four battleships, five cruisers, four light cruisers and three minelayers. These reserve ships seem to be spending much more time in port now than they have done in past years. Two gunboats of the mine-sweeping flotilla are here for refit, the *Jason* and *Circe*, the former being in need of such an extensive overhaul that she was paid off on February 2nd. There was a mishap in the Thames Estuary off Gunfleet on February 3rd, when the coastguard cutter *Snipe*, attached to the West Mersea Station, foundered through filling with water whilst in tow of the *Leda*, one of the fishery gunboats. Unfortunately an able seaman of the *Leda*, who was in the *Snipe*, was drowned in her. A tug was sent to Harwich for yard craft "No. 97," which raised the *Snipe* within a few hours. Satisfaction is felt here that the number of apprentices to be entered as a result of the forthcoming examination compares favourably with the total of last year, including as it does fifty-eight candidates altogether. Of these, one-half will be taken in the engineering department, twelve as engine-fitting apprentices and a similar number in the boiler-making trade.

Pembroke Dockyard.

The launch on February 23rd of the light cruiser *Cordelia* at this yard is the first that has taken place of any ship of the 1913-14 programme, some vessels of which do not yet appear to have been begun. A moral is pointed here, for delay in building ships, when once Parliament has sanctioned their construction, must adversely affect naval efficiency. Authorized in March last, the *Cordelia* was ordered soon afterwards, laid down on July 21st, and is now in the water, setting free the slip she has used for the laying down of a second vessel, the *Carysfort*. This is different from the case of the *Cleopatra*, allotted to Devonport, the keel of which has only been laid within the past few days. Other conditions being equal, the Fleet will obtain the services of the *Cordelia* about seven or eight months before the *Cleopatra* is ready, yet both vessels are of similar design. The reasons for delay must evidently have been financial rather than naval. Besides the *Cordelia* and *Carysfort*, the light cruiser *Nottingham* still occupies a certain amount of labour, but she is due to be completed by the second week of March. As regards vessels undergoing refit and repair, the destroyer *Thorn* has returned to duty in the Seventh Flotilla at Devonport, leaving the *Kale* and *Leopard* in hand. It is hoped that the forthcoming Navy Estimates will contain provision for several more destroyer refits. The number of apprentices to be entered in the dockyard has now been received from the Admiralty, and amounts to forty-one, of which twenty-nine are to be shipwright apprentices.

H.M. King George V. has graciously extended his patronage to the forthcoming International Aero, Marine and Stationary Engine Exhibition, which is to be held at Olympia in March, from the 16th to the 21st inclusive.

INSTITUTION OF NAVAL ARCHITECTS. The annual meetings will be held on the 1st April and the two following days, in the Hall of the Society of Arts, John Street, Adelphi. The Marquis of Bristol will occupy the chair.

A distinguished company was present at the Mansion House on the 4th February, when presentations were made to Captain Inch for his heroism during the burning of the *Volturno* in October of last year. The Lord Mayor, Sir T. Vansittart Bowater presided over the proceedings. The gifts to Captain Inch included—an Address on Vellum, The Quiver Gold Medal, a Gold Watch and Chain, a Silver Casket to contain the Certificate of the Freedom of London conferred upon Captain Inch by the City Corporation, Lloyd's Silver Medal for saving life at sea awarded by Lloyd's Committee and a purse of gold. A diamond and sapphire pendant and an afternoon silver tea service were presented to Mrs. Inch.

H.M. BATTLESHIP "QUEEN ELIZABETH."

IN the history of the British Battle Fleet, from the earliest days of the ironclad to the present, it will be found that the development of type has proceeded more by a series of steps than along any continuous line of evolution, each step represented by some "super-battleship," which far exceeded its forerunners in fighting efficiency and which was gradually improved upon—or generally approximated to in design—by the types which followed, until another drastic innovation in ship design marked the commencement of a fresh era. The *Warrior* (1860), *Devastation* (1871), *Inflexible* (1876), *Collingwood* (1882), *Royal Sovereign* (1891), *Dreadnought* (1906) and *Orion* (1910) were all examples in kind; each was by way of being the best fighting ship of her day and each introduced a fresh step towards the apotheosis of the battleship. But it is doubtful whether any of them so completely transcended her contemporaries in fighting efficiency as does the *Queen Elizabeth*. The *Devastation*, *Dreadnought* and *Orion* were all wonder-ships of their day—the first a sea-going edition of the famous *Monitor*, bigger than any of her foreign rivals, completely armoured and mounting four pieces of the heaviest ordnance in turrets; the *Dreadnought*, with her unprecedented speed of twenty-one knots and all-big-gun armament, and the *Orion*, equipped with ten guns of bigger calibre than could be found in any of the world's battleships—each was deservedly an epoch-marking ship.

For a time, however, the *Queen Elizabeth* will enjoy the privilege of being armed with 15-inch guns against the 14-inch guns of her nearest rivals in power—of being enabled to discharge a broadside of eight 1,900-lb. projectiles at the maximum range against the ten 1,400 of the U.S. *Texas* (the most powerful ship now afloat) and of being possessed of a speed of 25 knots (designed) compared with the 21·5 average which obtains abroad. Until the Italian ships—which are not yet laid down—and the German "T" class—still on the stocks—are completed, the English ships will be the sole examples of the 15-inch gunned ship.

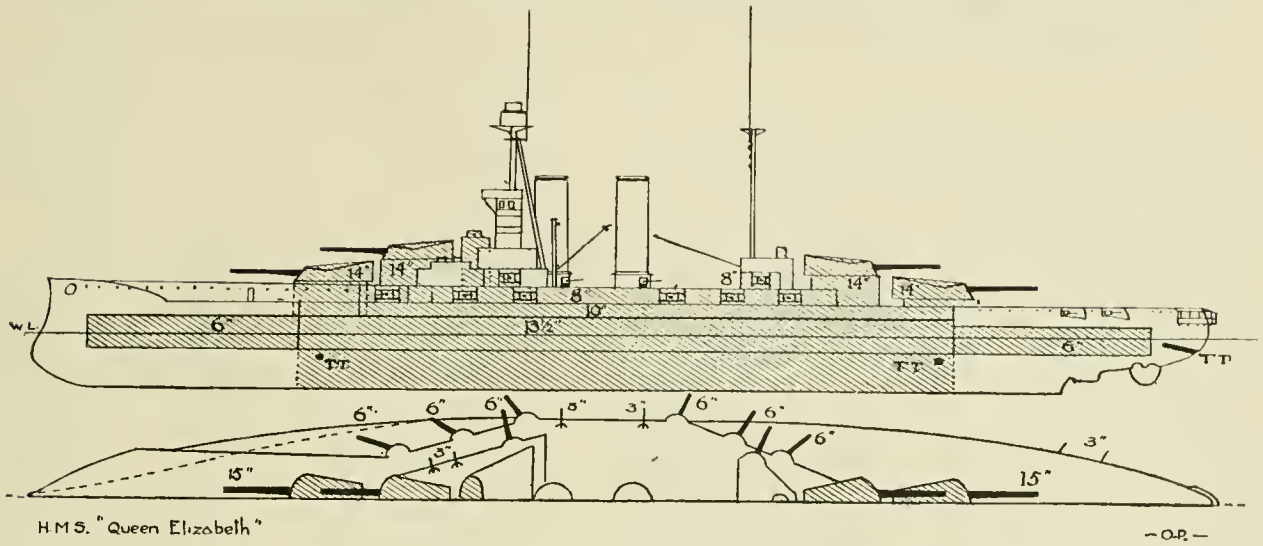
Although nominally a battleship, the *Queen Elizabeth* will in practice perform the rôle of "battle-cruiser." Her great speed is not designed for manœuvring purposes, but for overhauling the enemy's rear-guard and for tracking down her battle-cruisers; her armour is thick enough to withstand more than ordinary hammering and her guns can pierce opposing belts at battle-range, while her theoretical twenty-five knots is likely to be sufficiently exceeded on trial to justify the assumption that few foreign battle-cruisers could escape her. The introduction of the 15-inch gun to accomplish this end is typical of British policy, which is "superiority in both numbers and individual power." It would have been simple to have met the foreign ten 14-inch gunned ships by building twelve 13·5 gunned replies, as our 13·5-inch latest model fires the same weight of projectile. This is the line upon which the Continental Powers work; equality or something slightly better than your rival, however, does not postulate annihilation, and that will be the fate of the *Queen Elizabeth's* opponents. Twelve big guns are difficult to adequately "control," eight being the ideal group, according to our gunnery experts. Eight 15-inch guns can be worked as quickly, and probably more accurately, than a larger number of lesser calibre weapons. Putting aside the question of armour piercing, as it is claimed that the 12-inch will prove a match for any plates yet rolled, the 15-inch projectile is capable of far more smashing power than

the 14-inch. Loosened and leaking plates are more dangerous than shot holes, which can be plugged. But either way, whether by theoretical piercing of thicker armour by virtue of increased calibre and range, or by general destructive effect, assuming that armour is not going to withstand modern guns, the 15-inch has everything in its favour.

Whether or no the "Royal Sovereigns" which follow them will retain this calibre is at present uncertain. For some time it was assumed that the 2,000 tons less displacement credited to these ships would be accounted for by reduction in speed only, as twenty-one knots is their official velocity, the eight 15-inch armament being retained—as it well could be—being about equal in displacement absorption to ten 13·5 guns. Recently, however, from a usually well-informed source has been circulated the rumour that a return is to be made to the ten 13·5 equipment, and that the "Royal Sovereigns" will be little more than "Iron Dukes." Personally we do not pin much faith upon the suggestion. If the bigger gun is indicated, it will be retained; the policy which brought it into being was no rash one, no blind step into the dark—a venture to go "one better" along unpractical lines. Granted that in the past the era of 16·25 and 17-inch guns was a short one; the *Benbow*, *Sanspareil*, *Italia*, *Lepanto* and the like remained isolated examples of ships carrying the biggest possible guns, because the construction of such guns was imperfect and shipbuilding of those days had not reached the state of development which could produce ships adequate to carry them with impunity. The *Italia* of 1880, with her four 17-inch pieces and 16 knots speed, was the prototype of the *Queen Elizabeth*. Her guns were bigger and her speed was higher than in any other battleship afloat. She could have overtaken and sunk them all—in theory. What she could actually have achieved in practice is an interesting study; possibly she was possessed of all the potentialities that caused her to be regarded with such concern by other Powers—probably her lack of armour would have made her an easy prey to smaller ships armed with quick-firing guns. Shooting had not reached a stage of anything like accuracy; the 17-inch gun fired very slowly and misses would be as frequent as hits. But—and the "but" is where the whole basis of the idea comes in—when they did hit, the recipient would in all probability be placed *hors de combat*. To-day a different state of things obtains. The 15-inch is as accurate as the 13·5, which possesses greater precision than the 12-inch. Ships can fight them without damaging their structure, and armour can be distributed as widely as is required to ensure stability and gun protection. The factors that proved the death knell of the *Italia* will have no influence upon the *Queen Elizabeth* of to-day, and in consequence evolution should proceed along recognised lines in subsequent types. Regarding the *Queen Elizabeth* as a battle-cruiser, the *Royal Sovereign* should have the same armament with reduced speed—a logical conclusion, admitting that eight guns form the best fighting group and that the standard twenty-one knots is sufficient for battleships.

To discuss the ship herself. Her dimensions are:—Length 650 feet over all, beam 94 feet and draught 27½ feet. Upon a displacement of about 27,500 tons she carries eight 15-inch 45-calibre guns in four 14 turrets, placed two at each end, the second and third being raised to superfire axially, and a secondary battery of sixteen 6-inch guns behind 8-inch armour along the upper deck and in the superstructures. Twelve 3-inch guns are also mounted to ward off aerial attack. The positions of these are best shown by the accompanying plan. The disposition of the 6-inch gun is interesting. In the "King George V." and "Iron Duke" classes the main object in distribution of secondary guns seems to have been to mass them up forward, where they could be all trained on attacking torpedo craft coming up from that most likely quarter. Only a couple or so guns had a stern bearing. It seems, therefore, that in the *Iron Duke* the 6 inch was regarded more as an anti-torpedo piece than for battle use, and the same line of reasoning influenced its distribution in the case of the 4-inch of the *King George V.* The spacing in the *Queen Elizabeth*, however, indicates an entirely different conception of its uses. Equal concentration of fire is provided fore and aft, while the pair of guns which in the *Iron Duke* were carried on the main deck aft, where they were admirably situated to deal with astern torpedo boat attack, have been brought up to the after superstructure and their place taken by 3-inch guns. All of which points to the inclusion of the 6-inch guns as part and parcel of the battle equipment of the ship—their effect against the *Empress of India*, when one of the "Town" class of cruisers completely wrecked her upper-works by employing these guns against them, has effectually demonstrated that they have more than a defensive value against torpedo boat attack. The employment of 8-inch armour to protect them is sound. It is thick enough to keep out secondary projectiles, even if it is at the mercy of big guns, while the wide spacing is more likely to localize destruction than could be the case in a more bunched-up battery. Much can be said for the American "all-or-nothing" system of armour distribution—the thickest or none at all, thin plates only being looked upon as so much wasted shell-bursting weight; but it cannot be denied that more of the English ships' 6-inch guns are likely to remain intact after an engagement than would be the case in the U.S. *Nevada*. And when all is said and done, it is after the battle that most is to be feared from torpedo attack. *Vide Tsushima!*

For water-line protection there is a 13½ belt extending from the base of the foremost to the aftermost turret, with 6-inch continuations up to within about twenty feet of the bow and stern. Above this there is 10-inch along the lower deck side amidships with 8-inch over the battery, while the four superstruction casements are also similarly armoured. Amidships the hull is covered with thin armour—two or three inches probably—down to the keel, and a most elaborate system of under-water internal protection reinforces this. Naturally, there is no official basis for any of the foregoing particulars, but they can be taken as accurate. The thickness of the bulkheads and decks is uncertain. The great speed has only been attained by substituting oil fuel entirely for coal, the extra gain in space permitting over 4,000 tons to be stored, and Parsons turbines of 58,000 nominal h.p., driving four screws, give her a designed speed of 25 knots. Boilers are Babcock, with Yarrow in the *Warspite*, the remaining three ships probably having



Plan of the *Queen Elizabeth*.

similar types. Five submerged torpedo tubes are fitted, two on each side and one in the stern. These discharge the 21-inch weapon.

In appearance, the *Queen Elizabeth* will be a handsome ship, there being none of the irregular funnel heights and sizes and stump masts that have been so prominent in recent types. Range-finders in armoured hoods will be placed on the crown of each conning tower, while the search-lights are disposed on the fore and after superstructures. The bridge and tripod mast are just as in the *Iron Duke*, but the tall main mast instead of a stump between the funnels will effectively differentiate her from that ship. Boat derricks are swung from stumps athwart of the fore funnel, and from the after superstructure. Both funnels are to be round and of equal size and height.

The five ships of the class are building as follows :—

Name.	*Yard.*	*Laid down.*	*Launched.*	*Completed.*
Queen Elizabeth	Portsmouth	Oct. 21, 1912	Oct. 16, 1913	Oct., 1914
Warspite	Devonport	Oct. 31, 1912	Nov. 26, 1913	Oct., 1914
Barham	Clydebank	Jan. 31, 1913		Spring, 1915
Valiant	Fairfield	Feb. 24, 1913		,, ,,
*Malaya**	Elswick	July, 1913		Autumn, 1915

* Gift of the Federated Malay States.

and in the comparative table they are shown in column with foreign contemporaries.

COMPARATIVE TABLE.

		Number in Class.	Displacement.	H.P.	Speed.	Armament.	T. Tubes.	Armour.* A	B	C	D	Year of Launch.
ENGLAND ..	*Iron Duke* .	4	26,400	31,000	22·5	x. 13·5″ xii. 6″	5	12	10	12	6	1912-13
	Queen Elizabeth ..	5	27,500	58,000	25	viii. 15″ xvi. 6″	5	13½	10	14	8	1913-14
CHILI ..	*Almirante Cochrane* ..	2	28,000	37,000	22	x. 14″ xvi. 16″	4	9	7	10	6	1913-14
FRANCE ..	*Lorraine* ..	3	23,177	29,250	20	x. 13·4″ xxii. 5·5″	4	11	7	10½	7	1913
	Normandie ..	4 or 5	24,830	33,000	21	xii. 13·4″ xxiv. 5·5″	4	12½	8	17·9	7	1914
GERMANY ..	*König* ..	4	26,575	35,000	22	x. 12″ xiv. 6″	5	13	8	13	6¾	1913
	"*T*" ..	2	29,000 (?)	40,000	23·5	viii. 15″ xvi. 6″	5	13	8	13	?	1914
ITALY ..	*Mazzini* ..	4	29,510	48,000	25	viii. 15″ xx. 6″	5	11	8	12	?	1915
RUSSIA ..	*Imperatriza Maria* ..	3	23,000	25,000	21	xii. 12″ xii. 6″	4	12	8	10-12	5	1914
U.S.A. ..	*Texas* ..	2	27,000	28,100	20·5	x. 14″ xxi. 5″	4	12-9	10-8	11-8	5	1912
	Pennsylvania ..	1	31,400	34,500	20·5	xii. 14″ xxii. 5″	4	14¼	*nil*	18	*nil*	1914

* A—Main belt amidships. B—Side above belt. C—Big guns. D—Secondary guns.

INSTITUTE OF METALS. The annual meeting will be held March 17th and 18th.

A Rubber Exhibition will be opened on the 24th June and will continue until the 9th of July. The exhibition will be held at the Royal Agricultural Hall, and is to be opened by H.R.H. Prince Arthur of Connaught.

THE NEW LAWE SHIPYARD, SOUTH SHIELDS.—Mr. C. Rennoldson, the chief of the firm of Messrs. Chas. Rennoldson and Co., gave a supper on the 13th February to his office staff and workmen to celebrate the opening of the new yard at South Shields. A considerable number of workmen were present who were associated with Mr. Rennoldson in the old yard. Mr. Rennoldson in the course of a short speech made during the evening said that the prospects of business for the yard were very good and among other business they had secured a contract for a high-class ship from the P. & O. Company.

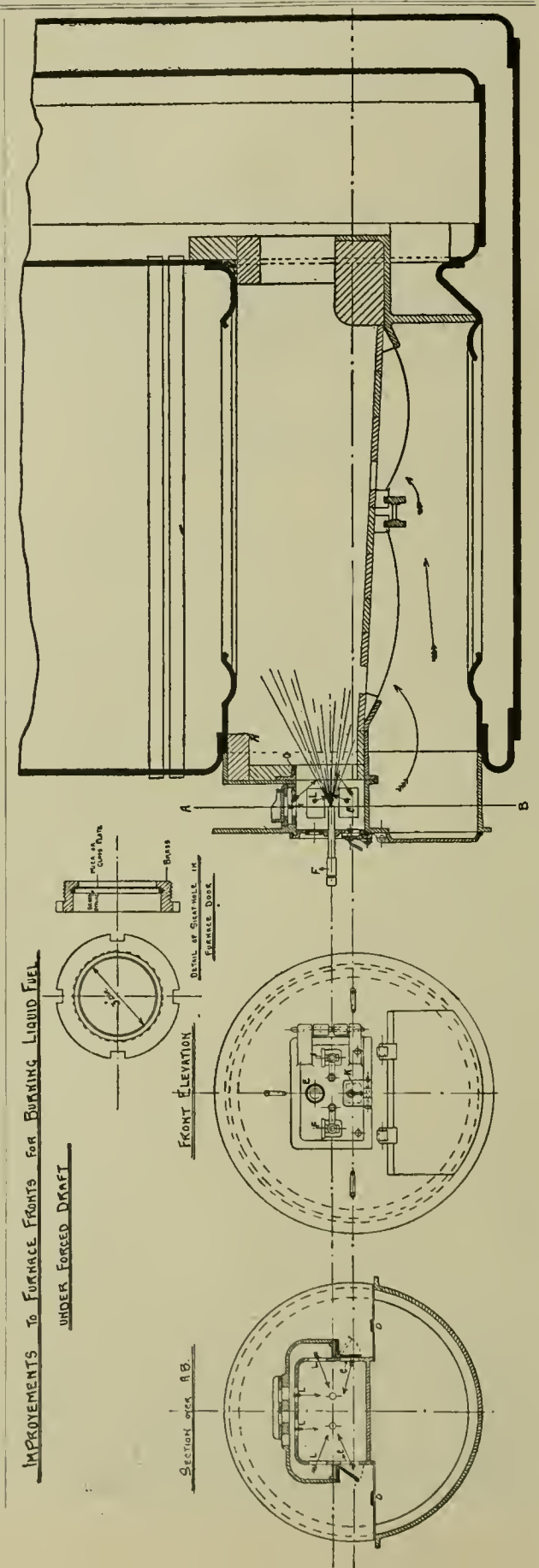
COMBUSTION OF OIL FUEL IN MARINE BOILERS.*

Continued from page 262.

The oil fuel may be burnt with the ordinary coal fittings in position, with forced or natural draught on the Zulver system. This method was introduced by Mr. C. Zulver, a member of the Institute and the author of the recent paper on "Liquid fuel as a source of energy for the propulsion of ships and its proved advantages over coal." Mr. Zulver has installed this system in some of the vessels under his superintendence with remarkably economical results. The burners used are of the ordinary Korting or Meyer type, but are somewhat longer for forced than for natural draught, in order to bring the orifice of the burner to the correct position with regard to the furnace mouth. A further point in favour of this system is the fact that the same heating area is used for coal as for oil burning, and it is especially suitable for boilers with furnaces of large diameter where some difficulty might be experienced in getting the whole area of the furnace to act as a heating surface. Although the heat may be said to be to some extent local, yet it is, to coin a paradoxical term, locally distributed. The change from coal to oil or *vice versa* can be easily and simply effected. The labour of replacing firebars, etc., is saved and a vessel could be converted in a few hours. On the s.s. *Havre* the system has been changed from oil to coal-burning in two hours.

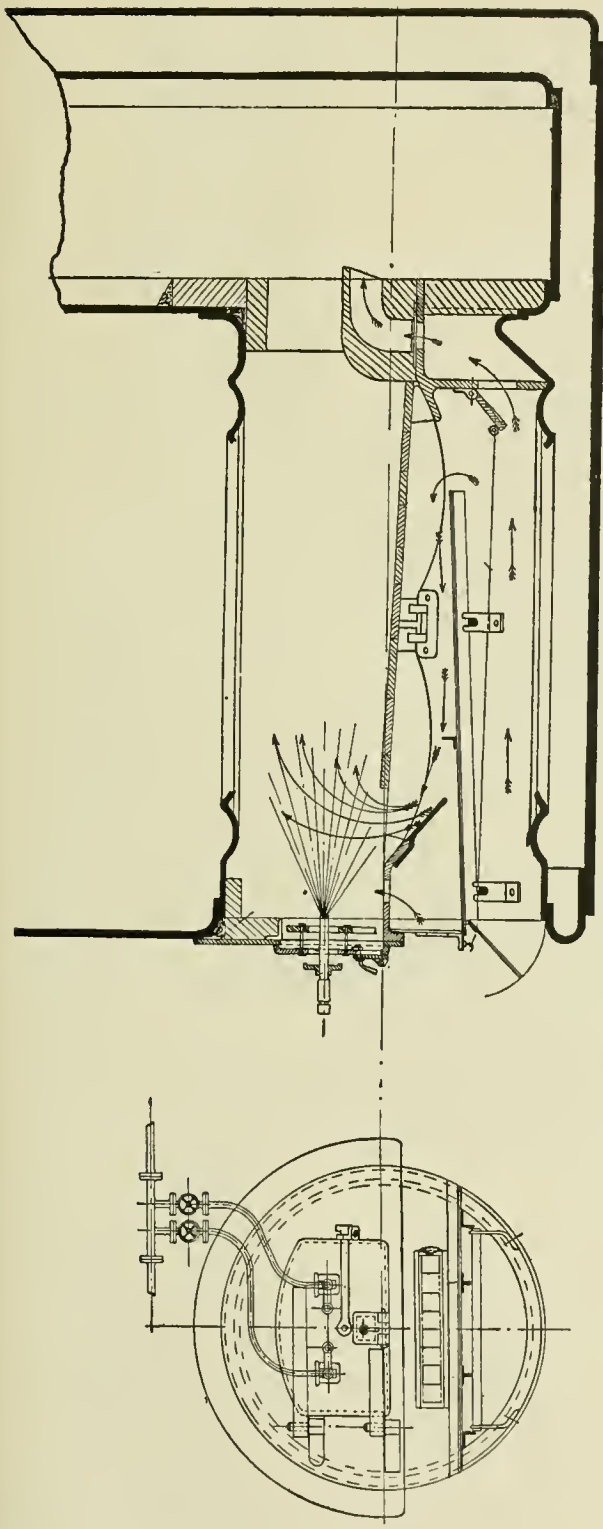
When burning oil with forced draught the fan should be run as low as possible, consistent with good combustion, otherwise heat is being blown up the funnel. With forced draught as with any other fuel system it is always possible to run without smoke. It is good practice to obtain a slight smoke at the funnel with both the steam and the forced draught systems. In the first case we are not wasting steam, and in the second not using too much draught. A water column of $\frac{5}{8}$" to $\frac{3}{4}$" in the ashpit gives good results, but each vessel has its own peculiarities, and the best pressures must be obtained by trial. The usual fuel pump pressure would be from 35 to 45 lbs., depending on the fuel. As shown in the diagram the firebars are bricked over, with the exception of a strip at the front end, through which the draught passes upwards from the ashpit. The addition of a small retarding block placed about 2 ft. from the furnace neck effects a slight economy in some cases. Observation mica discs enable the state of the fire to be examined without losing draught. A small door is fitted to the furnace door to allow of the insertion of the carbon slice. As there is no occasion to open the fire door it is made air-tight with asbestos putty and clamped up. The burners are asbestos-packed where they enter the doors, and cleaning is easily effected by means of the plug at the back without removing the burners from the doors. As in all forced draught jobs the vertical air heating tubes should be periodically examined and cleaned. In an oil-burning vessel there is sometimes a tendency to allow the smoke tubes to run a considerable time before sweeping. Although the quantity of soot found after a long run is very minute

*Read before the Institute of Marine Engineers by Mr. Jas. S. Gander, (member).



Vertical Longitudinal Section.

Zulver's Furnace Arrangement for burning Liquid Fuel (forced draught).



Zulver's Improved Furnace Arrangement for burning Liquid Fuel and Coal (natural draught). Front Elevation.

when compared to that which may be expected from a coal-burning job, yet, as the insulating properties of oil soot appear to be slightly greater than those of coal soot, it is good practice to clean the tubes once a month.

With the direct-pressure system of the Meyer type, when no steam is available for starting fuel pumps, it is necessary to inject the fuel at the commencement with a small hand pump—usually a hand lever is fitted to the motion arm of the ordinary fuel pump—and the oil passes through a coil heated by a kerosene blow-lamp or burner. This very seldom happens, as, in the case of all fires being out of action, shore steam or compressed air is generally supplied to carry on the ordinary work of the engine room. With the steam with oil system and no steam or compressed air from external sources available for starting, the oil is sprayed on to a small wood fire inside the furnace by the force of its own gravitation. In this respect the direct-pressure system is preferable.

When raising the temperature of the fuel oil on direct-pressure systems, the exhaust valve of the heating coils should not be opened too much if it is required to heat the oil to a high degree. If the valve be almost shut down the pressure in the coils will be nearly the same as the initial supply with a correspondingly high temperature, and the heating effect can then be regulated by the amount of opening of the steam valve. On the other hand, if the exhaust be too much open the pressure in the coils will be nearly the same as that of the exhaust line, or almost atmospheric, with a temperature which will not serve to heat the oil beyond 200° Fahr. In extremely cold climates and with heavy grade fuel, a little difficulty may arise, owing to the thickening of the fuel interfering with the working of the pump. This is provided against by the addition of a small heating coil to each of the suctions in the bunkers so that when occasion arises a little steam may be passed through, which has the effect of raising the temperature of the surrounding oil. The previous remarks with reference to cleanliness of bunkers, separation of water and efficient filtrations, apply to all modern oil-burning systems. as well as to the steam with oil system, under which heading they were included. The steam burner, and other similar types, having a large opening for fuel with a low velocity, are much less sensitive to the presence of water or impurities.

Much has been said at various times with regard to the supposed risk attending the consumption of oil fuel in marine boilers. Although it is recognised in these days that oil fuel is a perfectly safe factor for the generation of steam, the safeguards against possible accidents are very thorough. Among these are the following:—(*a*) Ash cocks are fitted with lengthening rods so that they may be operated from the deck or the stokehold. (*b*) Sand boxes are provided in each stokehold. (*c*) Water hoses are in readiness in prominent positions. (*d*) The steam supply to fuel pumps can be shut from the deck or below. (*e*) Regular inspection and the washing of stokehold plates each watch. Experiments show that water is infinitely more effective than any other practicable agent in the quenching of burning oil fuel. It immediately lowers the temperature, with the result that the fuel can no longer burn. In an experience of five years of continuous oil fuel burning the writer

has not seen a fire occur; it is simply a matter of the observance of ordinary precautions. Comparing the steam with oil and the direct-pressure system, the advantages are greatly in favour of the latter, especially for marine purposes. Although the steam system is very simple and easily worked by firemen of average intelligence, and the cost of installation must be comparatively small, yet the direct-pressure system is far more economical of fuel. Of direct-pressure systems the Meyer-Smith, by reason of the recent improvements which have been mentioned before, appears to hold the foremost place for economy and convenience.

Speaking from the practical standpoint of the marine engineer the following advantages are obtained from the use of oil fuel:—(*a*) The quantity of bunkers received can be accurately ascertained very quickly. Tallying while taking bunkers no longer necessary. No trimming. (*b*) No cleaning of fires required—therefore no currents of cold air enter the furnace, which may cause damage. (*c*) Full and regular steam can be maintained without any trouble in all climates. (*d*) Steam is under perfect control. On receiving an order by telegraph the engineer can increase or decrease the steam supply to the fuel pump without leaving the engine room. (*e*) More perfect combustion with oil than with coal—hence greater calorific efficiency. (*f*) The engineer, if necessary, is independent of his firemen. (*g*) The boiler tops, bilges and all engine-room and stokehold spaces can be kept in an absolutely clean condition, and there is no smoke or fumes to discolour paint-work or ashes to choke bilges. (*h*) Combustion not affected by heavy weather. At times when coal firing might become impossible the oil-burning vessel can carry on as under normal conditions and the bilges are always clear in the event of a washout. (*i*) If worked in an intelligent manner oil fuel is practically smokeless.

Comparing the systems, it is apparent that the most economical appears to be the Zulver system, with forced draught, so far as practical and reliable data are obtainable at the present moment. Reliable data with reference to the latest Meyer-Smith system have not yet been formulated, but, so far as we have been able to observe there is a decided economy over the older type of furnace front, although the advantages of the new pattern burner are not yet so apparent in some vessels as might be expected.

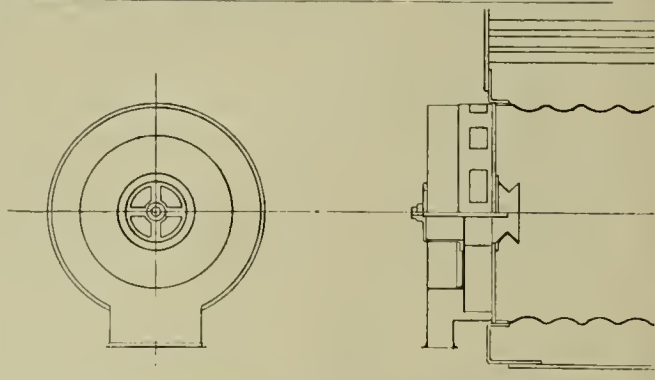
S.S. *Donax*.

Particulars of diagrams taken on passage from Kustondje to Alexandria 19/10/13.

Diameter of cylinders H.P. 25" M.P. 41" L.P. 66" Stroke 45"
Expansion H.P. 27" M.P. 27" L.P. 24".
Pressures H.P. 177 lbs. M.P. 58 lbs. L.P. 15 lbs. Vacuum 25½".
Pitch of Propeller 16'1 5/32".
Speed of Screw 11 knots.
Slip 3·8.
Revolutions per mile 377·7.
Speed of ship 10·6 knots.
Revs. per minute 70.
Main stop valves, full speed. Throttle valve, full open.
I.H.P. 590 H.P.
" " 520 M.P.
" " 652 L.P.

Total I.H.P. 1762

Oil per day 17 tons. lbs. per I.H.P. per hour ·89 lbs.
Quality, Good Roumanian.
lbs. per I.H.P. per hour—Propelling power ·83.



White's Mechanical Oil Fuel System (positive draught).

Temperatures.

Sea 70°. Hotwell 126°.
Air 65°. Condenser 135°.
Feed 216°. Heater 222°.
Discharge 118°. Stroke Weir's Pump 8 per min.

Fan Engine.

Revs. per min. 298. Air in trunks 2". Air below bars 9/16.

Fuel Plant.

Temperature of Oil 190°-200°. Pressure 60-70 lbs.

Smoke Light Haze.

Weather, etc.

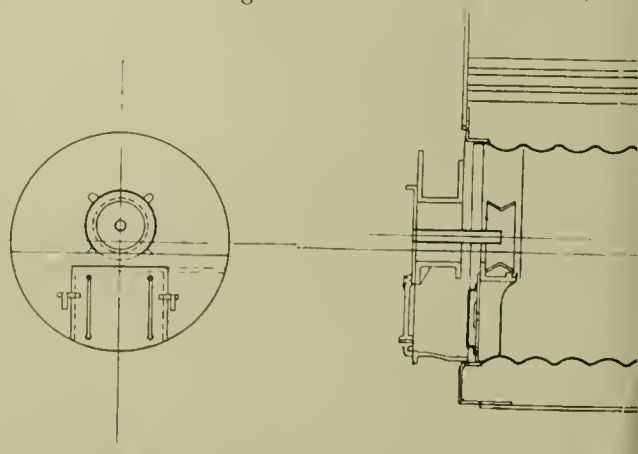
Wind N.E. moderate. Sea Moderate, Barometer 29·92.

Loaded.

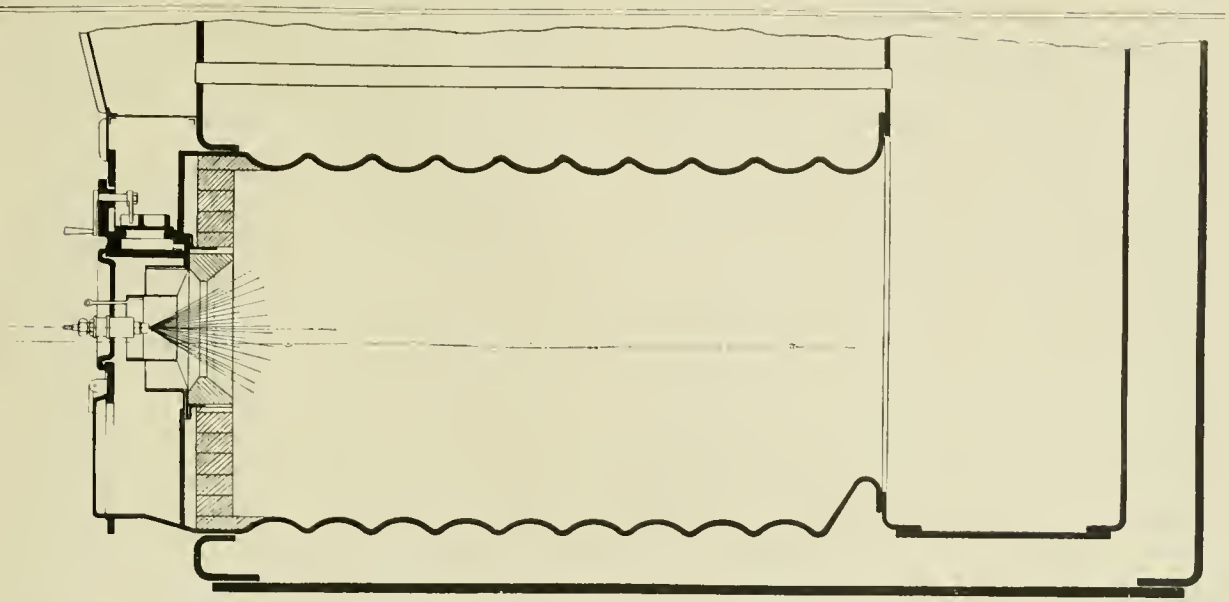
The table below gives a comparison of three vessels fitted with different systems:—

	Clam.	*Conch.*	*Donax.*
Cargo carried in tons	4400	6830	4950
Indicated H.P.	1111	1760	1767
Tons oil fuel per day	17	22·5	17
Tons coal per day (North Country)	25	33·5	27
Lbs. oil fuel per I.H.P. per hour	1·43	1·19	0·89
Lbs. coal per I.H.P. per hour ..	2·09	1·77	1·42
	Steam.	Meyers old type.	Zulver type with F.D.

It should be mentioned that the *Clam* is a very old type of vessel, and is not fitted with independent feed pumps, and the newer feed heating appliances, while the other two vessels are so equipped. The *Clam* and the *Murex* are of the same type, and give the same average results. So far as the marine engineer is concerned the comparisons of the various consumptions per pound of oil used per indicated horse power, do not satisfy. One vessel may be fitted with the latest feed heating and superheating appliances, etc., while the others may be of an older type, possessing none of these advantages. If we consider, however,



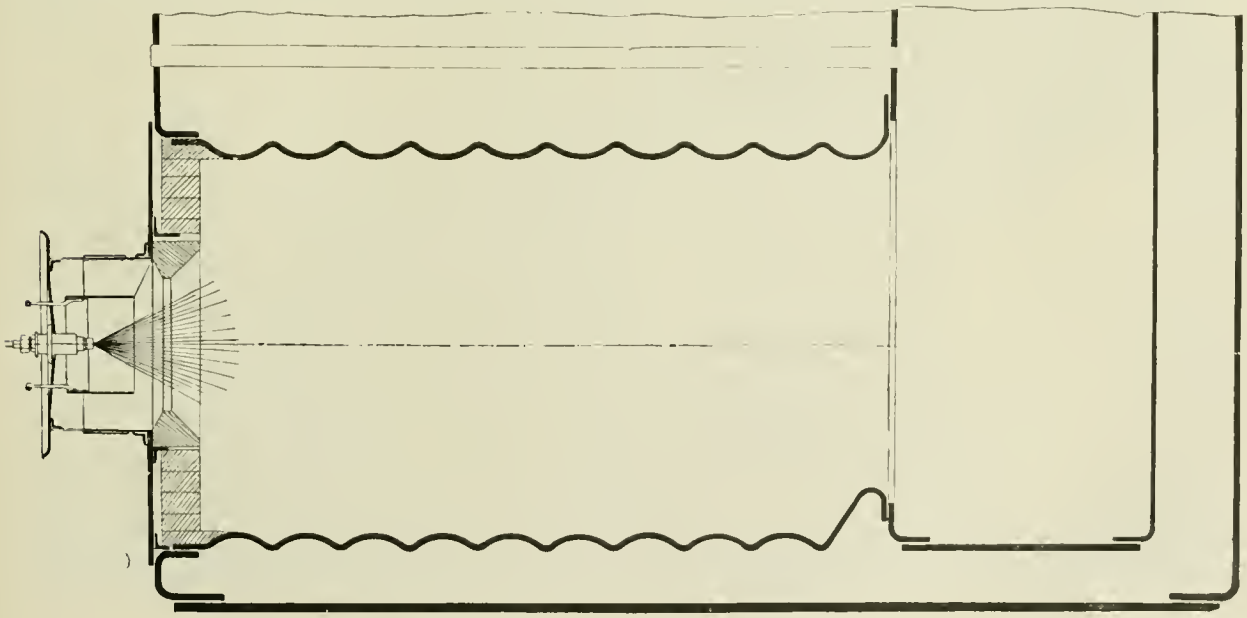
White's Mechanical Oil Fuel System (forced draught).



Wallsend-Howden Oil Burning System (forced draught).

the amount of oil burnt per I.H.P. per hour, compared with the amount of coal burnt for the same power, the other conditions cancel out from both sides of the equation, and we are enabled to ascertain whether or no the oil fuel is being economically burnt. An average result gives the ratio of coal burnt to the weight of oil burnt for the same power as 3·2. This means a saving by weight of 33 per cent. and shows oil fuel to be 50 per cent. more effective. This does not agree with the respective calorific values. Taking average British coal with a value of 14,000 and average fuel with 19,000 B.T.U., the efficiency advantage should be about 36 per cent. The added efficiency which is obtained in practice is due to the more complete combustion of oil fuel. From the details of a test taken at the works of Smith's Dock Co., we gather some valuable information relating to temperatures which are not easily obtainable at sea. Dimensions of boiler 8′ 9″ by 8′ 6″ with two plain furnaces, 31″ external diameter, 6′ 1″ long, total heating surface 470 sq. ft. Meyer Smith system used.

	Deg. Fahr.
Temperature of air	54
,, in passages round air conveyer in furnace fronts through which the air passes to furnaces	870
,, of furnace	2375
,, of combustion chambers	1280
,, of smoke box	580
,, of feed water	120
,, of oil in heaters	220
Pressure of oil to burners	35
,, steam on boiler	80
Consumption of oil per hour	lbs. 164·35
Total water evaporated per hour	,, 2592·51
Water evaporated from and at 212 deg. Fahr. per lb oil used	,, 15·7
Brand of oil used—2 parts Texas, 1 part Borneo.	
Specific gravity	944
Flash point	deg. Fahr. 246
Calorific value (not stated in table but would be about) B.T.U.	19,105



Wallsend-Howden Oil Burning System (natural draught).

Actual practice shows that far less boiler trouble may be expected with oil fuel than with coal. Perhaps the most frequent source of leaky tubes in boilers is the constant necessity for cleaning fires when coal burning and currents of cool air pass to the back ends. The only cleaning necessary with an oil system is the occasional removal of small quantities of carbon. This operation is performed through a small hand hole door large enough to admit the slice. The furnaces are more evenly strained, especially with the systems where the whole of the furnace acts as a heating surface, and it is reasonable to suppose that the circulation is more efficient for the same reason. The fact that the tubes are always more or less clean and there is therefore no occasion to sweep them at sea tends to give that part of the boiler a longer lease of life. As there are no sharp temperature differences at any part of the furnaces there is no pitting and corrosion. Collision chocks are eaten away by acids formed in damping ashes as when cleaning coal fires.

No paper dealing with direct pressure systems would be complete without a reference to the White Mechanical Oil System and the Wallsend Patent liquid fuel burning system. These systems are similar in principle to Meyers, but vary in the details of construction. The author has avoided more than a passing reference to the compressed air system, having had very little experience in that direction and because this system, like the steam system, is being taken out of modern vessels and direct pressure systems installed.

(Concluded.)

MARINE MOTOR NOTES.

THE launch of the *Mississippi* into the waters of the Clyde from the Glasgow yard of Messrs. Harland and Wolff on Feb. 11th was an interesting event, in that this is the vessel built to the order of the Atlantic Transport Co., to be fitted with Diesel oil engines under construction at the Burmeister & Wain Glasgow works, in order to test the oil motor against the steam engine, in sister vessels. The preparations for the test places the competing builders on their metal, and the results will be looked for with very great interest; they will also guide other companies in determining future policies. The *Mississippi* is a vessel of about 5,000 tons, so that the trial of strength on the lines of economy in upkeep and working expenses is based on a fairly large undertaking. The vessels which are being built for the East Asiatic Co., on the Clyde, will also be supplied with their oil engines in Glasgow; these are in hand by the Burmeister & Wain works. The recent disaster to the submarine which unhappily resulted in the loss of all hands—thus bringing the total lives lost by submarines to four-score—, besides reopening the question of ensuring greater safety to those who, in the interests of the nation, engage in perilous ventures under the waters, has caused favourable consideration to be given to a life-saving apparatus, by which members of the crew of a sunken submarine can escape to the surface of the water by being ejected through an air cylinder fitted with doors and manipulating gear designed to suit such craft.

The location of the vessel in the depths was much delayed owing to circumstances which may be enquired into and rectified in the future; the presence of oil on the troubled waters ultimately led the searchers to the spot. It has been suggested that oil on the surface of waters whence arise fog-charged vapours has a beneficial effect upon the neighbourhood in reducing the density. The dense fogs which were experienced in years gone by around the low-lying district in the east of London, where the Royal Albert and Victoria Docks are situated—termed Plaistow Marshes, when the Victoria Dock was constructed sixty years ago—have not been so prevalent or so dense of recent years, while oil and its vapours have been more scattered around on the roads and waters by motor cars and vessels, thus adding to the suggestion a slight modicum of evidence.

There are several vessels, destroyers, etc., in hand being fitted with oil motors and quite a number of smaller craft, also launches for the British Admiralty. A few comparisons of small coasters after a season's work show very favourably for the oil motor, the cost of repairs and upkeep being very small and less than the steam engine. The committee constituted with a view to enquire into the use of alcohol for motors, best sources of supply, probable cost and a re-adjustment of the duty when the spirit is manufactured and used for commercial purposes, has entered upon its work of investigation, and it may be assumed that a good work will be done by the committee. There is great scope and a large area to travel over for its members, who are all deeply interested in the question of a spirit which can be manufactured from vegetable growths, to compete with that which is now in general use. The Thames motor barges are still being looked for; the first one is about ready, however, and with good management its progress as a commercial venture is assured. The number of oil-driven launches in the London Docks is increasing for the use of engineering firms and others whose business demands transit from one berth to another. The passenger steamer's lifeboats are being fitted with oil motors to a greater extent month by month, and there is no doubt that this is a wise thing. The days of the sailing ship with auxiliary power have not been revived to the extent that might have been expected, but the East Asiatic Co. appear to have some faith in the wind as a propelling power, and it has been announced that Messrs. Ramage & Ferguson, Leith, have received an order for a vessel of 5,000 tons with a good spread of canvas to court the favouring breeze, and to be fitted with oil engines which will give a speed of about 7 knots per hour in the calms.

Board of Trade Appointments.—The Survey Staff of the Marine Department of the Board of Trade is to be increased by a small number of additional appointments to each of the three grades—Engineer Surveyors, Ship Surveyors and Nautical Surveyors. The salaries commence at £200, rising to £400 per annum, and Surveyors are eligible for promotion to higher posts rising to £500 per annum, etc. All the appointments are pensionable, and selected candidates will be required to undergo a competitive examination in technical subjects. The age limits to each of the three grades is above 25 and under 40 years at time of examination. Intending applicants should apply forthwith to the Assistant Secretary, Marine Department, Board of Trade, Whitehall Gardens, London, S.W.

Nautical Training and the Education Authority.—In order to give a fair opportunity to boys who have been compelled by circumstances to start life as messengers and who then find, after a year or two, that their prospects of reaching any remunerative employment in the particular line in which they are employed are very remote, the Liverpool Education Committee, about a year ago, entered upon an excellent scheme to train boys of fourteen to fifteen years of age for entering the mercantile marine service. The subjects of instruction are:—a knowledge of the compass, ability to take the wheel, rule of the road at sea, semaphore, Morse and signal flags, bends, hitches, knots, splices, wire rope, first aid, physical drill, swimming, instruction in rowing and boat management. The scheme is an admirable one and it would be well for the education authorities, especially in districts adjacent to seaports, to consider the advisability of entering upon similar arrangements in connection with their evening classes. There are many boys to whom these classes would be a great boon and we commend the question in its widest aspect to the attention of all who are interested in the welfare of those youngsters, whose circumstances preclude them from learning a trade or business and who in later life may find themselves to some extent stranded or unable to obtain steady employment.

THE WHITE STAR TRIPLE-SCREW STEAMER "BRITANNIC."

AT quarter past eleven on Thursday, the 26th of February, amid much cheering and the sounding of syrens, the largest British-built vessel commenced to move off the slips in the shipbuilding yard of Messrs. Harland & Wolff, Belfast. It was a most impressive sight to see the mammoth vessel, rapidly gaining momentum, glide along the ways into her home upon the water, where, immediately upon becoming water-borne, she was taken in charge by tugs and towed to the berth where she will be fitted out for sea, and special efforts put forward to have her completed for service by an early date. Though the weather was not all that might have been desired, a constant drizzle prevailing, for some time before and after the launch, an immense number of people had gathered together to witness the proceedings. The launch was an extremely satisfactory one, and the officials in charge of the launching arrangements are to be congratulated on the success which attended the responsible and anxious work of putting a ship of such magnitude into the water. The launching weight was 24,800 tons, and the time taken 81 seconds, the maximum speed reaching 9½ knots. Invitations to the launch had been sent out in a generous manner, and stands marked "Visitors," "Owners," "Press" and "Staff" had been erected to accommodate the recipients of tickets, all of these stands commanding a good view of the vessel. Lord and Lady Pirrie were present, also Mr. Harold A. Sanderson, Chairman of the White Star Line, Miss Sanderson, The Hon. George Lambert, Civil Lord of the Admiralty, Mr. W. S. Graves, Ulster King at Arms (Capt. Nevile R. Wilkinson, C.V.O.), Viscount Newry, Lord Trimblestown, The Rev. A. A. Harland and Miss Harland, Members of the Belfast Corporation, Members of the Belfast Water Board, Mr. F. C. Pilkington, Governor of the Bank of Ireland, The American Consul (The Hon. Hunter Sharp), His Honour Judge Craig, Mr. James Gallaher, J.P., Mr. W. Macartney Filgate, Sir Peter O'Connell, Sir Robert McConnell, The Moderator of the General Assembly (Rev. W. J. Macaulay, D.D.), The Dean of Belfast (Very Rev. C. J. P. Grierson), The Right Hon. R. G. Glendinning, Sir Alex. Dempsey, Sir John Byers, Mr. W. H. McLoughlin, D. L., Sir Andrew Newton-Brady, R.M., Mr. Garrett Nagle, R.M., Mr. J. W. Kempster, Mr. Geo. Cuming and Mr. Charles Payne, the three last-named gentlemen being directors of Messrs. Harland & Wolff. The White Star Line was also represented by Mr. H. Concanon and

The *Britannic* entering the water

Fixed and Sliding Launchways, showing Wedging.

Mr. E. L. Fletcher, Managers, Mr. P. E. Curry, Manager at Southampton, Capt. Bartlett, Marine Superintendent, Mr. Willett Bruce, Superintendent Engineer, and other leading officials. The Belfast Harbour Commissioners witnessed the launch from their steamer *Musgrave*. Before closing these notes of the launch, the White Star management are to be congratulated upon the excellent arrangements made for members of the Press, whose thanks are consequently tendered to the Company for the great hospitality shown to them throughout.

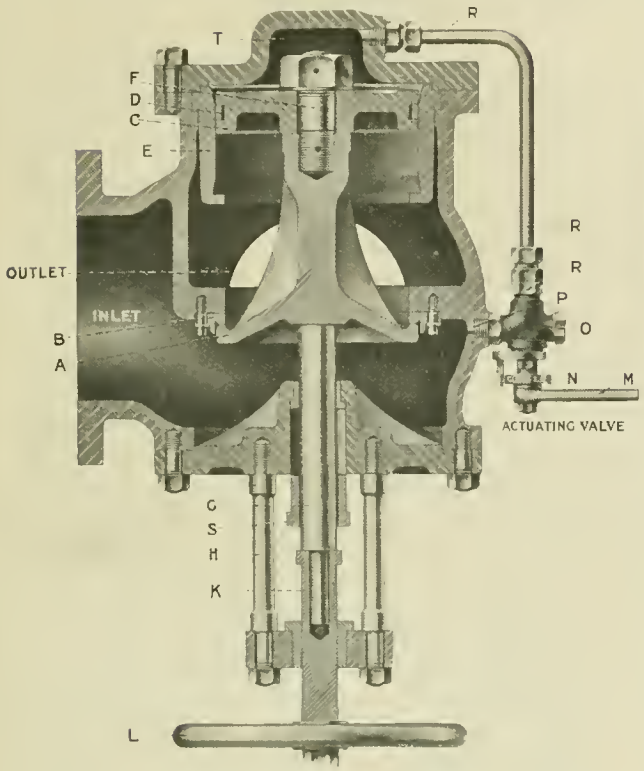
In accordance with a practice which has now been universally adopted by the greater companies which rival one another in the North Atlantic passenger trade, the White Star Company did not allow much detail in regard to their new leviathan to transpire before the launch. That she would exceed in length, beam and tonnage, her elder sister, the *Olympic*, was certain enough, but from the particulars we are now able to publish, we can compare her dimensions with those of other vessels.

The *Britannic* is in	
Length over all	about 900 ft.
Breadth, extreme	,, 94 ft.
Depth, moulded	64 ft. 3 in.
Total height from keel to navigating bridge	104 ft. 6 in.
Gross tonnage	about 50,000 tons
Load draught	34 ft. 7 in.
Displacement at load draught	over 53,000 tons.
I.H.P. of Reciprocating Engines	32,000
S.H.P. of Turbine	18,000.
Passenger accommodation	for over 2,500.
Crew accommodation	for 950.

The *Britannic*, which will be employed on the Southampton, Cherbourg and New York service, will not equal in tonnage any of the three big vessels of the Hamburg-American Line, for we know the exact capacity of the *Imperator*, whose gross register is 52,117 tons, whilst the *Vaterland*, which was launched by Messrs. Blohm & Voss at Hamburg on April 3rd, 1913, and which is appointed to make her first departure for New York from Hamburg on June 4th, 1914, is to be of some 56,000 tons. Her dimensions will therefore necessarily be greater than those of the *Britannic* or *Imperator*. Her beam, indeed, is not much more than that of the latter vessel, but she is said to be 15 ft. longer than her, whilst, as it is alleged, the third ship, which is still on the stocks, will similarly surpass the *Vaterland* and be of full 60,000 tons.

The *Britannic* is some 3,000 tons larger than the *Aquitania*, but with regard to speed the Cunard Co.'s boat will be the faster, her promised speed being 23 knots, whilst 21 knots seems to be all that is intended in the case of the *Britannic*, and of the German vessels the speed is said to be about 22 knots, but no doubt in practice all will do somewhat better than their contracts. As regards machinery, the *Britannic*, is to be propelled by triple screws, as is the *Olympic*, the engines being of the combination type—the outside propellers being served by reciprocating engines, whilst the centre one is actuated by a turbine. Herein the White Star practice differs from that of both the Cunard and German lines, for all four of these new vessels—following the example of the *Lusitania* and *Mauretania* of the Cunard Line and the new Allan liners *Alsatian* and *Calgarian*—have turbine engines and quadruple screws. It is interesting to note that the new *Britannic* is launched just forty years after her namesake took the water from the Queen's Island yard. The famous old ship was, of course, a single screw, her engines being of the compound tandem type. In those days Messrs. Harland & Wolff had not yet commenced the construction of engines, and the old *Britannic's* machinery came from the works of Messrs. Maudslay, Sons & Field, in London. In her early days this vessel was fitted with a lifting screw—the idea being to minimize racing and by dropping the propeller to a depth which enabled its blades to revolve below the line of the keel, to reduce slip when in deep water by giving the screw a denser medium in which to work. This idea involved the setting of the cylinders with a distinct rake. The result was such terrible vibration that after a few voyages the machinery had to be altered to the usual design then current. Thereupon the old ship became the favourite on the Atlantic, holding for many years the actual record for speed. She sailed from Liverpool on her maiden voyage to New York on June 25th, 1874, and made the large number of 271 round voyages to New York. This historic vessel steamed 2,032,500 statute miles, consuming 560,407 tons of coal in doing so, and carrying 112,711 first-class and 282,685 third-class passengers across the Atlantic. But towards the close of her career the *Britannic* added fresh laurels to her renown by acting as a transport during the South African War, and by taking out to Australia the Imperial Representative Corps, composed of details of the various branches in the British Army, on the occasion of the Inauguration of the Commonwealth of Australia at Sydney on January 1st, 1901. In fulfilling these missions she made eleven voyages, steamed 200,499 statute miles with a coal consumption of 65,659 tons, and carried 20,728 troops. Thus, in all, the *Britannic* covered no less than 2,232,999 statute miles, and consumed 626,000 tons of coal during her epoch-making career. It was specially stipulated by the White Star Line that the *Britannic*, when sold in 1903, should then be broken up, the owners feeling that so illustrious a career should not be tarnished by an extended, but less honourable period of existence. She was of but one-tenth the gross tonnage of her successor, whilst her length was only 455 ft., though that was considered remarkable enough forty years ago. The following table shows something of the increase of dimensions :—

View showing framing of inner skin ready for inner skin plating.



AULD'S PATENT COMBINED EQUILIBRIUM AND EMERGENCY STOP VALVE.

THE ordinary unbalanced stop valves of the mushroom type are quite unsuitable to the modern requirements of steam reciprocating and turbine machinery, owing to the difficulty in manipulating them and in keeping the valve surfaces steam-tight under the high pressures which now obtain. Balanced valves of the ordinary double-beat type certainly have facility of operation, but they are extremely difficult to maintain steam-tight under the large range of temperature which they have to undergo. Messrs. David Auld & Sons, Ltd., of Whitevale Foundry, Glasgow, are putting on the market a new design of equilibrium valve, which it is claimed overcomes all the above defects, and a sectional elevation of this valve is shown in the adjoining diagram, from which it will be seen that the construction is not only extremely simple, but there are no complicated or delicate parts to get out of order. There is no difficulty as to the steam-tightness of the valve, as it has only one seating to bear against, and in addition the whole steam pressure is available for keeping the valve on its seat. By the particular arrangement of the spindle and its operating gear all stress can be taken off the spindle when the valve is shut, while in opening the valve the greatest stress on the spindle is only that necessary to overcome the weight of the internal parts. A special arrangement is made by which the valve can be closed quickly in the case of a burst steam pipe or other cause, this being effected by moving the handle through 180°, on which the valve automatically closes itself. It will be seen that the bye-pass arrangement by which this function is carried out can be used to warm up the main steam pipes prior to opening up the main valve to admit steam.

Referring to the illustration the high-pressure steam enters at the branch marked inlet, and holds the main valve *a* tightly on its seat. When it is desired to open the valve the handle *m* of the actuating valve is turned to the position marked "open," which puts passages *p* and *r* in communication with one another and closes the passage *o* leading to the exhaust or the atmosphere. By this action steam is allowed to accumulate in the main cylinder *t* over the piston *c*, the latter being of slightly greater area than the valve *a*. Immediately the hand wheel *l* is slackened back the valve *a* is pushed open by the steam to the extent permitted by the distance through which the wheel *l* has been turned. To close the valve under normal conditions the wheel *l* is screwed up until the valve *a* is on its seat, when the handle *m* must be turned round to the position marked "closed," so as to cut off the supply of steam to the cylinder *t* and allow any steam which it contains to exhaust through the pipe *r* to the passage *o*, in which case the valve *a* is held firmly on its seat by the steam pressure. If, however, the valve has to be closed down temporarily, it may not in such a case be necessary to operate the handle *m* at all, as the valve *a* being balanced is quite easily operated by the hand-wheel *l* alone.

If it is found necessary to close the valve *a* quickly in case of emergency, the handle *m* is turned into the position marked "closed," when the steam at the back of the piston *c* is immediately exhausted to an exhaust pipe or into the atmosphere, and the valve *a* is instantly closed by the steam pressure behind it. It is important to note that the area of the passage *o* is so proportioned that the main valve will close noiselessly. It is obvious that after closing the valve in this way the hand wheel *l* should be screwed up before again turning on steam.

MESSRS. ASHWELL & NESBIT, LTD., of Leicester, have sent us their book on the warming, control of temperature and ventilation of steamships. The Company have fitted a number of well-known vessels with their patented systems, including the *Laconia*, *Franconia*, *Crofton Hall*, *Calgarian*, *Alsatian*, *Mauretania* and *Lusitania* and the book contains particulars of these installations with other useful information.

THE THAMES IRON WORKS.—The disappearance of an industry from any locality is always accompanied by regrets, and when that industry has been carried on for a great number of years the regret is all the deeper and more widespread. The launch of the *Buyuk Ada* on February 7th, from the banks of the creek, near Blackwall point on the Thames, revived memories of other days when the yard was crowded with visitors to see large war vessels—British or Foreign—slipping into the water. The vessel, which is the last of the orders booked by the Thames Iron Works, was completed by Messrs. Rennie, Forest & Co., of Wivenhoe, this firm having taken her over when the works of the Company were closed. She was ordered for Turkish owners and is intended to run as a pleasure steamer. She is well equipped and fitted for such service, being about 200 ft. long, with an estimated speed of over 13 knots. The christening ceremony was performed by Mrs. Rennie. The ground is now being prepared for other work in connection with the Great Eastern Railway Co., whose lines adjoin the yard and no doubt it will prove a useful area in view of the great traffic to and from the Victoria and Royal Albert Docks—with the large extension in course of construction on the Silvertown side of the latter.

THE "ROBINSON" SMOKE TUBE SUPERHEATER.

THE over-all economical advantages obtained by the use of highly superheated steam have long been fully appreciated by engineers. Superheaters of various types have been largely employed in connection with stationary and marine boilers since the early days of steam engineering, and are now in common use for these purposes. Mr. Robinson, the chief mechanical engineer of the Great Central Railway, has, for some time past, been directing his attention to the design of superheaters for locomotive and other tubular boilers. His inventions in this direction are being exploited by The Locomotive Superheater Corporation, Limited, of Palace Chambers, Bridge Street, Westminster, London, S.W. It is interesting to note that as long ago as 1828, Trevithick commenced experimenting with highly superheated steam, and in 1832 he obtained a patent for the common form of looped U pipes, similar to those so largely used to-day in the smoke and fire tubes of locomotive boilers. In the proceedings of the Institution of Civil Engineers is a communication made by Perkins, in February, 1837, in which he advocated the use of superheated steam in locomotives, and in 1847 there is a record of a smoke tube superheater fitted to one of the locomotives of the Eastern Railway of France, while in 1855 there is a record of a London and North Western Railway locomotive, fitted with a McConnell's superheater, showing an economy of 50 per cent.

History has shown that the disuse of superheaters after their high efficiency had been demonstrated was largely due to the inferior structure, both mechanical and chemical, of which the superheating elements were made, and further, to the lack of an efficient lubricant of a sufficiently high flash point, and the inefficient character of the steam packing then available, rendering it quite unsuitable for high temperatures. Much water has flowed under the bridge since those days and the recognised efficiency of reliable superheaters has rendered their general adoption almost imperative.

The success of the Robinson Superheater in locomotives has induced the inventor to adapt his type to marine boilers, and we have pleasure in describing and illustrating the superheaters of the Robinson type which have been fitted to the S.S. *Nottingham*.

As seen from the illustration, this superheater consists of a cast steel header or steam collector divided into transverse compartments open at the front and having a mild steel cover plate. Alternate compartments are for superheated and saturated steam, all the superheated steam compartments and all the saturated steam compartments being connected by two passages passing down the back of the header. This construction is clearly shown in Figure 1, which shows sectional views, and also a front elevation of the header. It will be seen, on reference to Figure 1, that the header is divided into six compartments A, B, C, D, E and F, with two vertical passages G & H, passing down the back of the header, the passage G connecting compartments B, D and F, and the passage H, connecting compartments

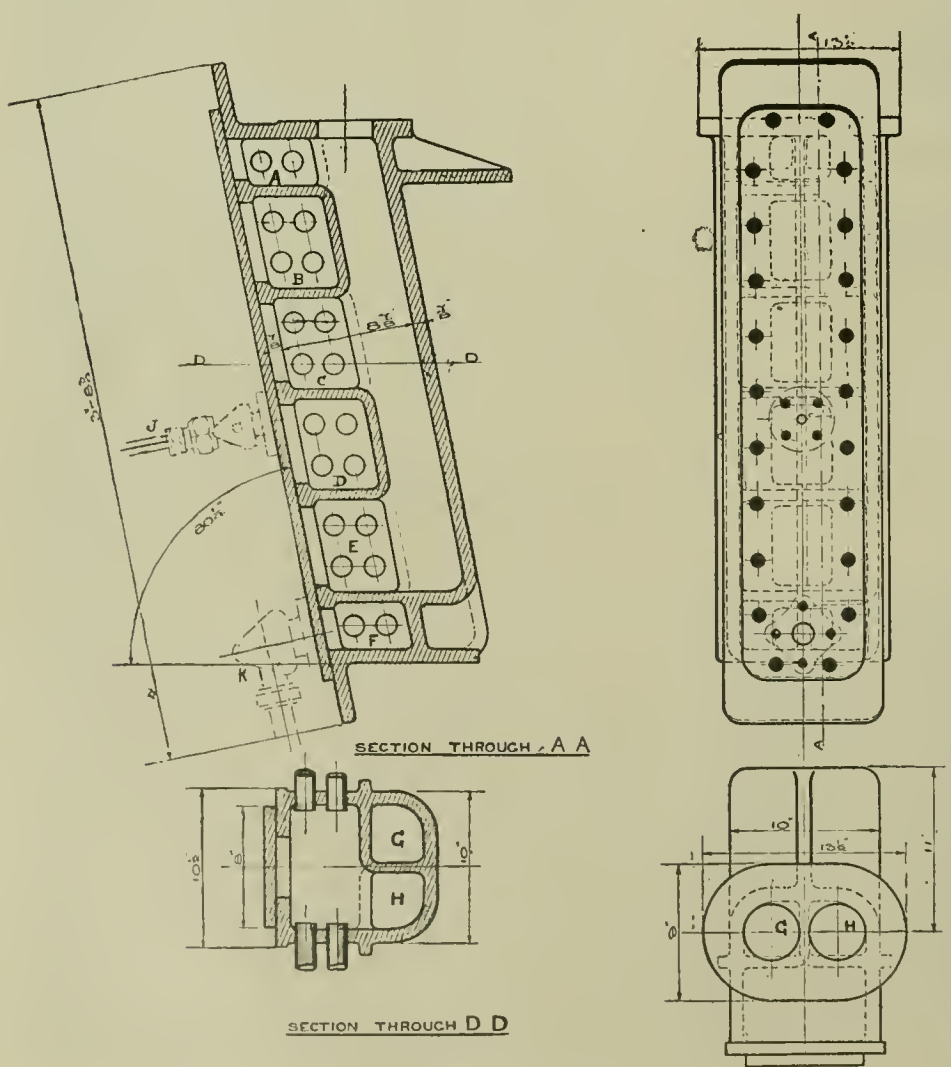


Fig. 1. Header for Marine Boiler (cast steel).

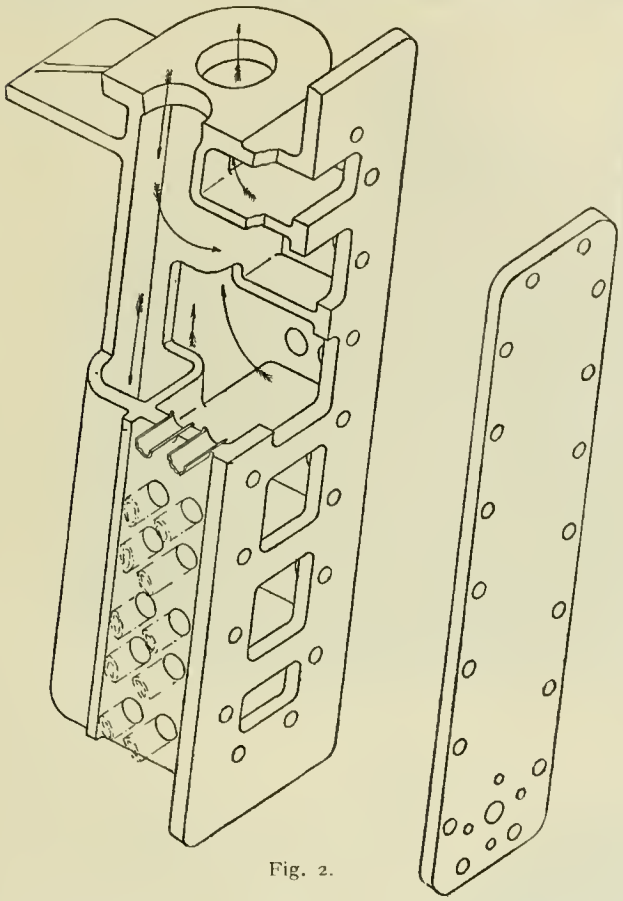


Fig. 2.

A, C and E. To the steam cock J is attached a flexible metallic pipe for use in blowing through the large smoke-tubes, whilst at K a large drain cock is provided for blowing out any sediment, which may collect in the header, whilst it is in a turbid state. The mild steel cover plates L are connected to the header by means of studs and nuts, the joints being made of wire gauze and red lead. A semi-sectional perspective view of the header is shown in Figure 2, illustrating very clearly the manner in which the longitudinal passages connect the transverse compartments, and also the facility of access to these compartments for examination and cleaning.

A special point in connection with this superheater is the method of attaching the elements to the header, which is by direct expansion into the holes provided in the side walls and clearly shown in Figures 1 and 2. This method of connecting the elements, whilst dispensing with all the usual bridge bars, bolts, nuts and joint rings, etc., with their well-known disadvantages, provides a joint having the maximum of safety and flexibility with a minimum of labour and expense in installation and upkeep. The elements for the "Robinson" superheater are manufactured from Swedish charcoal mild steel, solid drawn and cold finished, the method of manufacture being as follows:—Two tubes are bent at the ends at which there is to be a return bend, and are then sawn off parallel to their axes. The two sawn ends are then placed together and welded by the oxy-acetylene process, being loaded to give extra thickness at the ends to allow for erosion by the furnace gases, and are afterwards tested to 1000 lbs. per square inch. An example of this type of end is shown in figure 3, one view showing a semi-section, both ends being cut from actual tubes. These superheaters were subjected to a hydrostatic pressure of 500 lbs. per square inch previous to being fitted to the boilers, and are shown arranged for this test in Figure 4.

The boilers of the Steamship *Nottingham*, with the superheaters in position, are shown in figure 5. There are forty elements, $1\frac{3}{8}$ inch external diameter, to each boiler, these elements being inserted in smoke tubes, $5\frac{1}{4}$ inch external diameter.

The total evaporative heating surface of each boiler is made up as follows:—

	2250	square feet.
Smoke Tubes	1496	,, ,,
Combustion chamber and furnaces	431	,, ,,
Whilst the superheater heating surface is	323	,, ,,
And the grate area	63	,, ,,

As the engines of the *Nottingham* are twenty-five years old it was not thought desirable to exceed a superheat of 100° Fahr.

Prolonged tests have been made on this vessel while working under saturated and superheated steam, with the following results:—

	Saturated Steam.	Superheated Steam.
Average revolutions per minute	79·86	82·4
Total coal consumed in tons ...	66·1	57·6
Mean average speed (knots) ...	12·003	12·41
Mean draught	13′-8½″	14′-0½″

A comparison of these results shows that the revolutions increased 3·08 per cent., corresponding to an increase in speed of 3·27 per cent., and during the superheated steam tests the vessel was floating at an average increased draught of 4″, which corresponds to an increased displacement of 52 tons, and which would naturally absorb greater engine power to propel at equal speeds. This increased power and speed were obtained with a reduction in coal consumption of 12·82 per cent., notwithstanding that superheated steam was only used on the main engines and not on auxiliaries. Means, however, are now being provided for working the auxiliaries with superheated steam, which will result in a further reduction in coal consumption. Figure 6 shows the

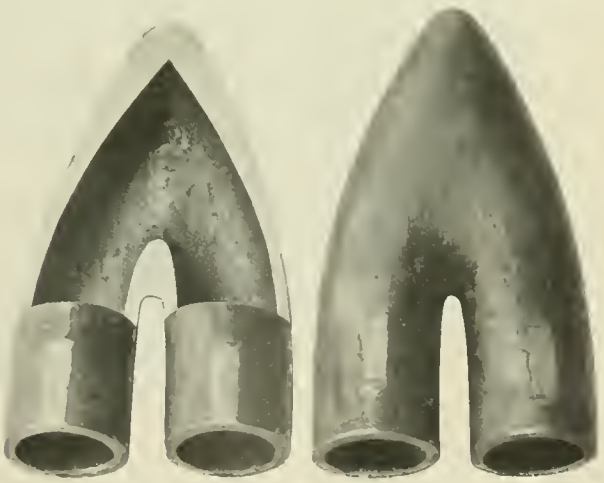


Fig. 3.

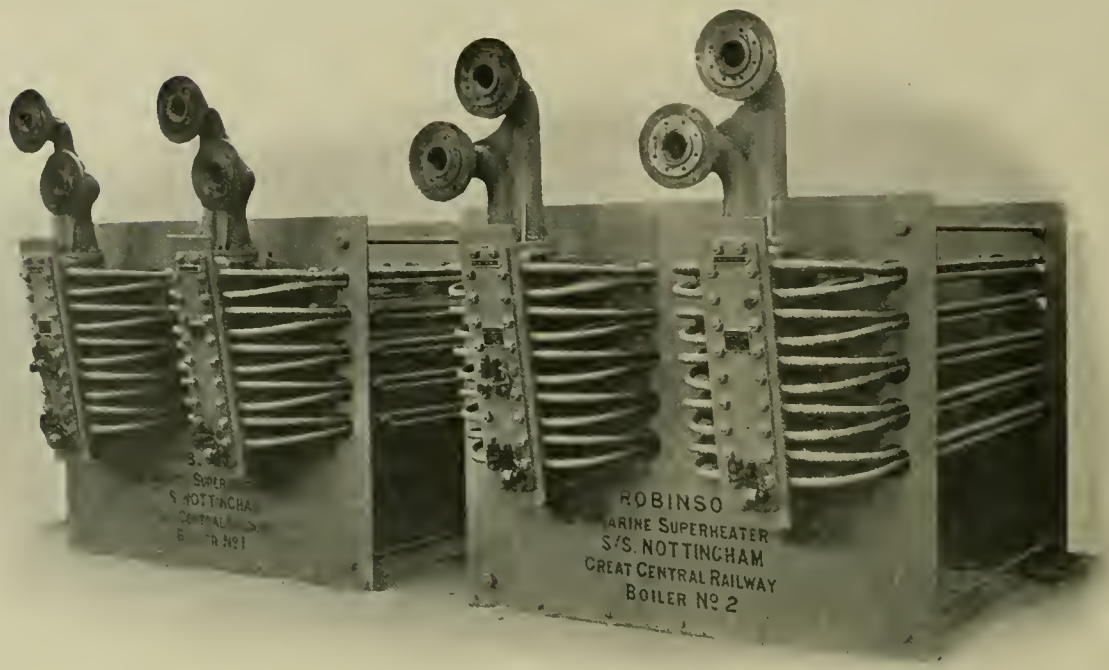


Fig. 4.
The Superheaters arranged for testing.

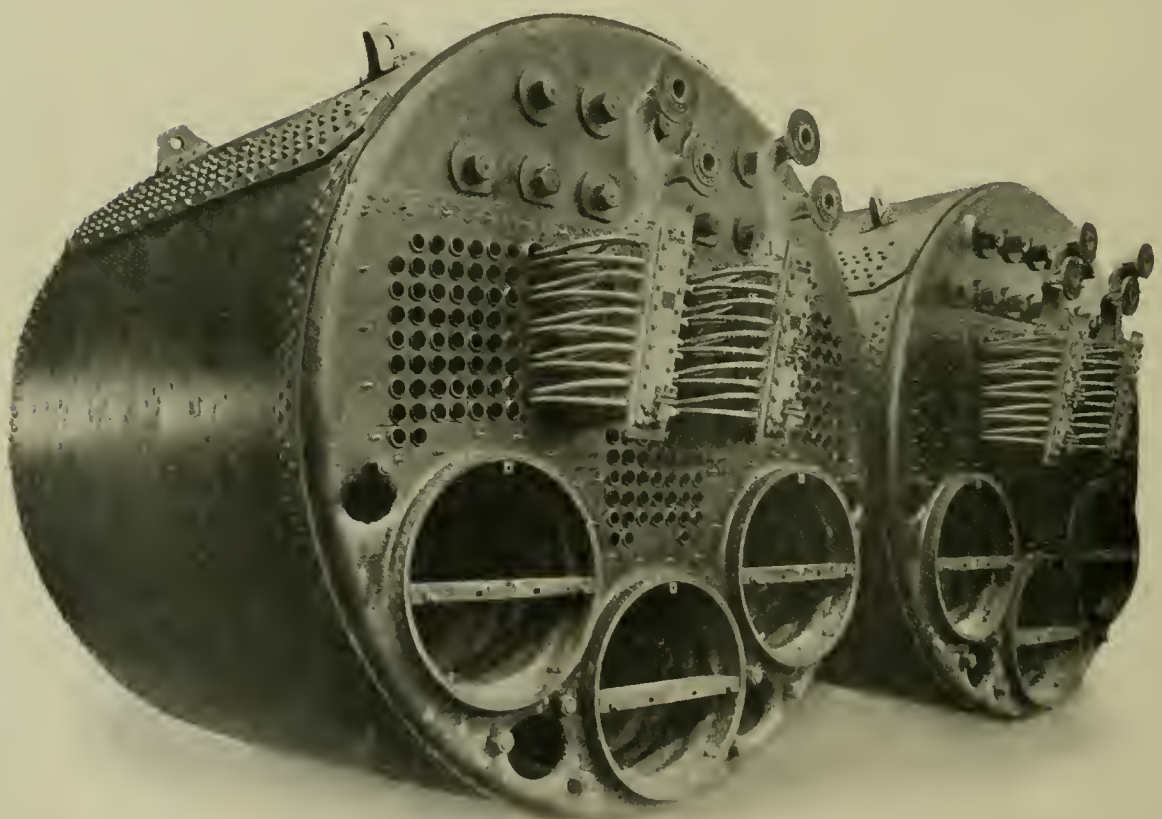
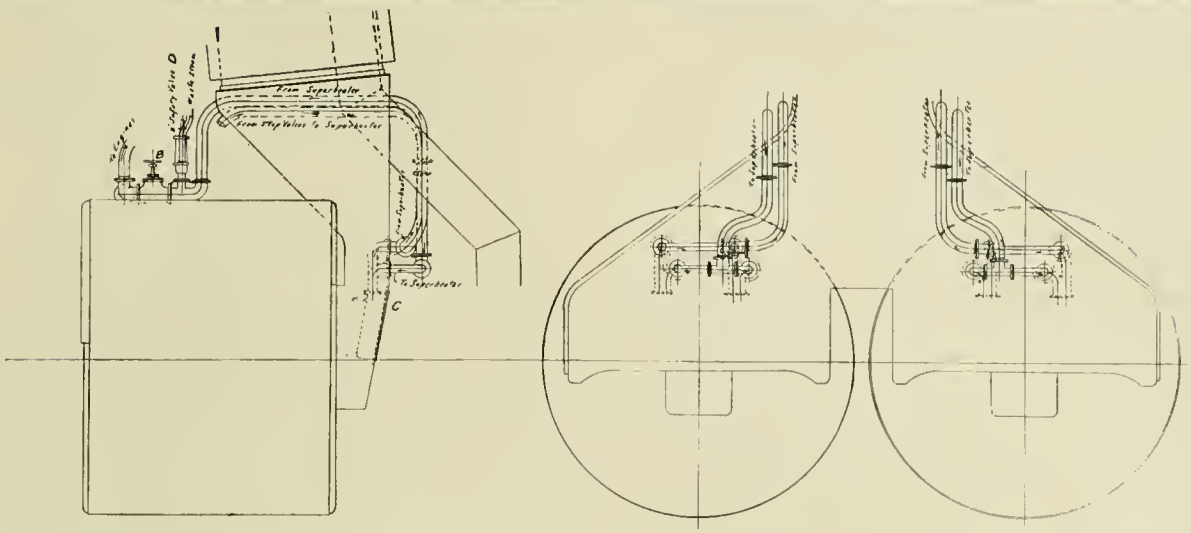


Fig. 5.
The boilers of the S.S. *Nottingham* with the Superheaters in position.



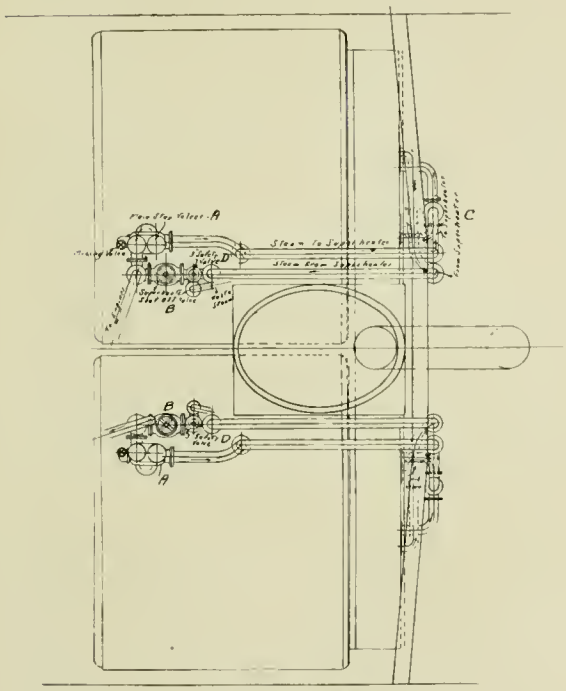


Fig. 6. Superheated Marine Boiler.
Arrangement of Steam Pipes to and from Superheater.
SS. *Nottingham*.

NOTE.—Superheater "C" and safety valve "D" lie between stop valves A and B, and there are no means of shutting off safety valve "D" from free communication with every part of superheater.

pipe arrangement for the *Nottingham's* boilers. Saturated steam passes from the boilers through the main stop valves AA, in the direction of the arrows to the superheaters CC. After passing through the superheater elements, the now superheated steam flows back again in the direction of the arrows under the safety valves BB, to the main engine steam pipe. Attached to the main stop valves AA are mixing valves, and by the use of these valves either all superheated steam, all saturated steam or any desired mixture can be supplied to the engines.

In completing the description of this installation, we will summarise the principal advantages which are claimed for the "Robinson" Superheater, as follows:—A simple and reliable header or steam collector; easy and quick access to all parts of header; ends of superheating pipes expanded directly into an integral wall which forms the bottom of the header; most perfect steam-tight joints attainable; elimination of flanges, bolts and packing rings; no obstruction to flue gases; maximum superheat and efficiency, with minimum of installation and maintenance.

INTERNATIONAL ENGINEERING CONGRESS.

THIS Congress, it is proposed to hold in September, 1915, in San Francisco, while the Panama-Pacific International Exposition is open. The American engineering societies organizing the Congress are the Society of Civil Engineers, the Institute of Mining Engineers, the Society of Mechanical Engineers, the Institute of Electrical Engineers and the Society of Naval Architects and Marine Engineers, and the Committee of Management is composed of the presidents and secretaries of these five societies, together with eighteen representative members located near to San Francisco.

Engineers all over the world are invited to become members of the Congress, and it is anticipated that, owing to the Exposition, a large number of visitors will be in San Francisco and neighbourhood, including a representative gathering of engineers, thus affording an excellent occasion for meeting in friendly conference and to mutual advantage. It is intended to have papers read and discussions held on engineering questions and embracing all the various branches of engineering. Prominence will be given to the work accomplished in connection with the Panama Canal and to papers descriptive of the various sections of the undertaking and of its probable influences on shipping and trade. The official language of the congress will be English, but papers in other languages will be welcomed, these will be translated and published in English. The fee for membership in the Congress is 5 dollars, this will entitle the member to receive the index volume of the Congress, also one sectional volume —which he may select to suit his own particular sphere. He will also be entitled to the privileges attaching to members of the Congress, attendance at the various meetings, etc. It is intended to arrange a series of visits and excursions to places in the neighbourhood on favourable terms.

Applications for detailed information and forms of membership may be made to Mr. W. A. Cattell, secretary, or to Mr. W. F. Durand, chairman of the committee of management, Foxcroft Buildings, San Francisco, Cal., U.S.A.

MESSRS. J. T. ELTRINGHAM & CO.'S NEW SHIPYARD.

On February 5th a new shipyard was officially opened at New Stone Quay, Willington-on-Tyne, midway between Wallsend and North Shields, by the firm of Messrs. Jos. T. Eltringham & Co., Ltd., who have transferred their enterprise from South Shields where the business was established in 1846 by the late Mr. Jos. T. Eltringham. The business was originally begun in South Shields to build boilers, and extended to the building of tugs and trawlers, of which large numbers have been turned out, but latterly they have built for delivery to the French a steam trawler, the *Normandie*, with a gross tonnage of 550 tons, one of the largest yet built. They built also vessels of the type of the twin-screw steamer *Holland* to the order of the Holland-Amerika line of Rotterdam, the *Flying Kestrel* and the *Flying Breeze* for the Alexandra Towing Co., of Liverpool.

In the new yard at Willington they have a site of over four acres, which gives much more opportunity for development, and they have transferred the whole of their business across the river. The entrance is on the main road to Newcastle-on-Tyne and North Shields, and the new yard has been laid out to the design of Mr. A. F. Fitzgerald, one of the directors, and carried out under the supervision of the general manager, Mr. J. Donovan, and is now one of the most modern and well-equipped yards in the country, and is capable of dealing with vessels up to 325 ft. in length.

The general office, with ship and engine building and drawing offices, is on the right of the main entrance, with the time office, yard manager's office, power switch office and general store on the other side. The mould loft, which measures 112 ft. long by 40 ft., is situated over the general store and the main entrance and communicates direct with the drawing office. The plate and angle racks are placed near the entrance and are served by a 5-ton crane. All the shipyard machinery, including the plate and frame furnace, is placed between the plate racks and the building berths, so that in no case does material have to be conveyed over the same ground twice. All the electric power of the whole of the yard plant is controlled from one central switch house, where the operator has a clear view of the whole of the plant. Pneumatic power is supplied by a four-cylinder air compressor electrically driven by an 80-h.p. motor, which is automatically governed by the variation of pressure in the air received. The gantry and crane for hydraulic riveting plant is fixed at the head of the building berths, and a very powerful hydraulic machine for flanging, manhole-punching, etc. There are electrically-driven pumps working on the hydraulic accumulator which are automatically governed by the rise and fall of the accumulator. At the north-east corner of the yard is the blacksmith's shop with a collection of up-to-date plant which includes two very fine hammers operated by compressed air. The air pressure is automatically governed and the exhaust from the hammers is utilized to assist in ejecting any smoke from the building. The paint shops and carpenters' stores are at the head of the building berths, in close touch while the vessels are on the blocks.

There are four building berths at the east end of the site, and the whole of this frontage has been sheet piled and the centre line of keel blocks piled up to 50 ft. of the quay front. Adjoining the berths is the quay, on which are placed electrically-operated sheer legs, with a lifting capacity of 60 tons.

The engine-building works are on the Quay. This is a new department and great care has been shown by the designer in laying them out for the economical production of good work. All the machinery is electrically driven and a splendidly equipped tool store has been provided. The pattern and joiner's shops are beside the engine works. They are 80 ft. long by 40 ft. wide, are three storeys high and are equipped with the most modern wood-working machinery, all electrically driven. There is a large belt and sawdust pit under the sawyer's shop and prompt arrangements are made for the removal to the plate furnace of any shavings and refuse. Prior to operations the whole of the site was levelled, ashed and steam rolled, and space has been reserved at the west end of the yard for a dry dock, capable of accommodating a 353-ft. steamer, as the firm's repairing business is an extensive one. During the last three years over 300 ships have been dealt with in the repair department, all classes of hulls and machinery.

There are three vessels in course of building. Two of them are to the order of Messrs. R. Hastie & Sons, of North Shields, and the third is being built for Messrs. S. Pearson & Sons, of London. The keels were laid on the day the new yard was opened.

MARINE BOILER EXPLOSIONS.

(Board of Trade Enquiries.)

Report No. 2,263. While a steam fishing boat was engaged on the fishing ground in the North Sea off Dunstanburgh Castle, one of the cross tubes of the boiler burst on the lower portion and opened out to such an extent as to empty the boiler, but without injuring anyone. The boiler was of the vertical type, built of steel, and with one cross tube above the fire, the fumes from which were led up to the funnel by a central tube in the usual way. The diameter of the boiler was 2 ft. 4 in. by 4 ft. 8½ in. high, and the shell plate $\frac{5}{16}$ in. thick, crown plate $\frac{3}{8}$ in. thick, flanged to suit the shell and the uptake tube. The firebox was 1 ft. 10½ in. in diameter, the plate being $\frac{5}{16}$ in. thick; the uptake tube was 8¼ in. diameter, $\frac{7}{16}$ in. thick, and the cross tube which burst 9 in. diamter and $\frac{3}{8}$ in. thick. There were four sighting doors for cleaning and examination purposes, one of these doors was opposite the tube opening into the boiler. The bursting of the tube was due to corrosive influences reducing the thickness to such an extent that it was unfit to stand the pressure of 80 lbs., to which the safety valves were loaded. The boiler was eight years old, was fed by sea water, and cleaned periodically, but not inspected from time to time as it should have been.

No. 2,265. A steam trawler, while occupied off the west coast of Ireland was disabled owing to the front plate of the boiler, above one of the furnaces, cracking for a distance of about 2 ft. and opening out about ½ to $\frac{1}{8}$ in. for some 10 in.; steam and water escaped, thus emptying the boiler. The cause of the fracture in the plate was attributed to the effects of expansion and contraction of the furnace, thus producing alternate stress movements on the front plate, tending to bind and ultimately to fracture it. The boiler was built of steel, of the ordinary single-ended marine type, 10 ft. 3 in. long by 12 ft. 6 in. diameter, fitted with two plain furnaces each 6 ft. 9 in. long by 3 ft. 5½ in. diameter, the plates being $\frac{49}{64}$ in. thick, each having a separate firebox. The safety valves were set for 180 lbs. pressure. The fractured plate was repaired by oxy-acetylene welding and the boiler tested by hydraulic pressure satisfactorily.

LLOYD'S REGISTER SCOTTISH STAFF.

Under the auspices of the Scottish Staff of Lloyd's Register of British and Foreign Shipping, a company of nearly 200 met for dinner in the St. Enoch Station Hotel, Glasgow, on the evening of February 14. Mr. James French, the recently appointed principal surveyor at Glasgow, presided, and the company included a large number of gentlemen of prominence in the shipping and shipbuilding world. Colonel J. M. Denny, in proposing "Lloyd's Register," said there were now 23,000,000 tons of shipping in Lloyd's, 2,000,000 tons were launched last year, and 2,000,000 tons were under construction. Ten million tons were classed abroad, over 800,000 tons were under construction for owners resident abroad, and 500,000 tons were building to Lloyd's class in foreign countries. Referring to the burning question of safety at sea, he said that there was the temptation to yield to popular clamour. He did not consider that absolute safety at sea was attainable except at a prohibitory cost. A ship would have to be so heavy as to float unloaded at her winter freeboard; she would have so many bulkheads that she would have the minimum of comfort and produce the minimum of revenue, and she would have so many boats that there would not be room to move about her decks. An attempt to reduce danger to an absolute minimum would necessarily increase danger. Mr. Thomas L. Devitt, in replying, said Lloyd's Register was unquestionably the premier classification

society of the world, whether from the point of view of classed tonnage afloat, tonnage building to class, or international reputation. Comparing the present time with twenty years ago, the classed tonnage afloat had nearly doubled, the tonnage building to class was nearly three and a half times as much, the tonnage building abroad to class had increased twenty-fold, and the staff of exclusive surveyors had more than doubled. The Register approximated closely to an international classification society, and it was often preferred by shipbuilders and shipowners abroad to their own national registers. The vacancy in Lloyd's Register Staff caused by Dr. Thearle's death had been filled by the appointment of Professor Abell as chief ship surveyor, while Mr. Charles Buchanan had been promoted to be principal of the chief ship surveyor's staff. Mr. Buchanan was a Clyde-side man, and had rendered yeoman service to the society both in this country and abroad. Professor Abell was a comparatively young man, but he had a distinguished career, and was recognised as one of the most brilliant naval architects of the day. He also offered to Mr. French their congratulations on his promotion to the principal surveyorship at Glasgow. Lord Inverclyde, in proposing, "Shipbuilding and Engineering," said that in one way the equipment of the Clyde was deficient. It had no dry dock capable of taking the big steamers which were now being built. He was very glad, however, that the proposed dry dock at Renfrew had not yet been started. He hoped they would never see a dry dock of large dimensions there. A large dry dock was required, and he hoped that some day it would be made at the mouth of the Clyde. But such a dock could not be made at the mouth of the Clyde until they had the Clyde under one control. In the course of the evening, Mr. F. C. Gardiner proposed as a special toast the health of Mr. T. J. Dodd, the retiring principal surveyor at Glasgow, and on behalf of the Glasgow committee, presented Mr. Dodd with a pair of silver candelabra and a silver salver suitably inscribed. Mr. Dodd replied expressing his indebtedness to the committee and his confidence that the society would continue to flourish.

WOOD CHARCOAL, ITS MANUFACTURE AND USES.

THE paper given by Mr. W. D. Ashton Bost to the Institute of Marine Engineers on February 2nd, was a very interesting one on the merits of wood charcoal as an insulating medium for refrigerated chambers and holds. Dealing with the manufacture of charcoal, the process was explained and the different kinds of charcoal referred to, with a general summary of the history of charcoal production and its uses in the manufacture of gunpowder, briquette moulders' blacking, charcoal iron and steel, and specially in the employment of flake charcoal for insulation purposes on board steamers carrying refrigerated cargoes.

Regarding the general service rendered by wood in connection with preparations derived from it, the author remarked on the different kinds and their value for special purposes, whether hard, medium or soft, the resinous woods having a value of their own for distillation of turpentine, resin and oils. The cellulose, which is a component part of wood, is used for papermaking; while vascalose gives methyl-alcohol and acetic acid, formic acid being yielded from cellulose. From the pine trees is obtained valuable tar, such as the well-known archangel tar. In the preparation of charcoal, the lump variety requires about twenty-four hours to cool after it leaves the retort, the air being excluded, while flake charcoal cools off in ten minutes in the open air. The former takes fully twelve hours to become carbonized; the latter is more readily treated and is only in the retort for thirty-five minutes before it is carbonized.

The main theme of the paper consisted however in the argument for fire prevention, and a considerable amount of data and tables deduced therefrom was given with reference to the Board of Trade returns for the past twelve years on fires at sea. The author maintained that from the figures put forward the number of fires at sea on insulated vessels was certainly not greater with insulation of a combustible nature than with incombustible, and indeed the figures showed that the balance was if anything in favour of vessels where the insulating material was charcoal as against silicate cotton and similar substances. Possibly this was as a result of the silting down of silicate cotton leaving free air spaces, but with all due respect to statistical science it is probably the chance result of the range of figures taken—a frequent source of error when generalizing from insufficient data.

The author's remarks on the matter of fire prevention and trend of the subsequent discussion serve to show that while the insulating medium may be a factor to be reckoned with the real source of trouble lies with the wood erections and hold fittings, and any system of rendering these less liable to combustion, or in preventing the use of naked lights in the region of combustible material, would be more effective in preventing fires than in attempting to deal with the insulating medium.

In describing the various kinds of charcoal, Mr. Bost pointed out that flake charcoal was made from wood shavings and, apart from the service in which it was employed as an insulating medium, the quantity made was small. The manufacture of charcoal had grown from small beginnings and a large amount is now manufactured. The use of charcoal iron gave an impetus to charcoal burning, and in many places where suitable wood was plentiful slag heaps were found, showing the shifting of the industry to suit the supply of material required.

BRITISH CORPORATION.

THE dinner of the staff of the British Corporation was held in the St. Enoch's Hotel, Glasgow, on January 31st. The chief surveyor, Mr. J. Foster King, welcomed the guests and presided over the assembly. The toast of the evening was proposed by Mr. J. R. Campbell, naval architect, who stated that the British Corporation had been of great value to the shipping industry since it came into being and deserved the support of shipowners and shipbuilders. It had been instrumental in introducing new methods and improving conditions in connection with shipbuilding, and the number of vessels built under the supervision of the staff showed that the services rendered were appreciated; the latest addition to the Allan Line, the *Alsatian*, was one of the finest vessels in the fleet, and in the Atlantic trade, and he referred to her as an example of the class of work classed by the Corporation. Adding a tribute to the excellent work done by their chairman, ably assisted by Mr. Benson Taylor and the staff, he wished success to the British Corporation. Mr. J. Foster King in acknowledging the toast said that while an element of superstition might have surrounded the entrance of the thirteenth year of the century and while it had not been free from anxieties in some respects, yet in reviewing the work of the year, he could congratulate the company on the results attained and the progress made in increased tonnage registered under the supervision of the Corporation. During the year 343,000 tons of shipping had been built under their classification. New types had been constructed and encouragement had been given, after careful consideration, to a new type of oil steamer, which had proved a success. The co-operation which had been established between the Italian Registration Society and the Corporation was a pleasing feature of the times, while the relationship established in connection with the Government Departmental committees had shown that the services of the Corporation were appreciated. Referring to the work of the Departmental Committees he indicated that the tendency was to legislate on broad and reasonable lines rather than on narrow and rigid rules. The toast of "Our Former Colleagues" was proposed by Mr. J. F. Macdonald and acknowledged by Mr. Edington, and that of "The Chairman" was submitted by Mr. Fred F. Perris (Middlesbro').

Messrs. Swan, Hunter & Wigham Richardson, Ltd., the well-known shipbuilders and engineers, have issued a book on floating docks. It is very nicely illustrated and gives illustrations of docks built by the Company and sent to different parts of the world. Almost every kind of floating dock is shown and the descriptive matter tracing the origin of the floating dock, construction, working and maintenance, etc., is very interesting.

THE THERMO-FEED PUMP GOVERNOR.

IT has long been recognised that the conditions of highest efficiency in steam generation can be effected when the conditions of fuel supply and feed water can be kept as near constant as possible for any given set of conditions. Much has been done in this direction in the British Navy with regard to firing boilers, furnace by furnace, at predetermined periods, so that the proper consumption of fuel per unit of area of grate surface can be carried on at a much more constant rate than can possibly be done under conditions of haphazard firing, and the nett result has been a much higher duty from the boilers.

Efforts are now being made to deal with the other side of this problem, by automatically controlling the operation of the feed pump through the medium of the water level in the boilers fed by the pump, so that with the regulation of the feed-water supply and the uniformity of furnace firing the total efficiency ought to show some substantial advance. This result is attained by the new thermo-feed differential pump governor, manufactured by Messrs. Ronald Trist & Co., Ltd., of Coronation House, 4, Lloyd's Avenue, London, E.C., the well-known manufacturers of S.E.A. ring packings and thermo-feed boiler regulators. The device in question depends firstly upon the pressure in the main feed pipe from the pump, and secondly upon the special mechanism by which the continual stopping and re-starting of the pump for small variations of pressure in the main feed pipe are entirely overcome. It will be recognised that there is no difficulty in controlling the device so that it might stop when a given pressure has been obtained, but the conditions are quite different and very onerous when the rate of supply continually varies, and consequently the pressure of supply varies at the same time.

Quite apart from the feed pipe pressure, as a whole, it is clear that each stroke of the pump creates variations in fluid pressure, causing a kick or throb in the water column, involving the increase in the pressure of a few pounds only, and consequently the range within which the stopping and re-starting are carried out must be such as to include any of the ordinary chance variations incidental to pumping duty.

As an example, one may take a pump working at a normal pressure of 150 lbs. per square inch, and the throb on the water column may increase the pressure to 160 lbs. The top end of the range must be set somewhat above this, say, for example, 162 lbs. Dealing with the other end of the range, it may be taken that the pump after stopping shall not re-start again until the pump line pressure has dropped to 140 lbs., so that there is not a continual stopping and starting, which might generally be supposed would occur with apparatus of this sort.

Having outlined roughly the part of the problem that has been attacked and solved, we will now describe in detail the apparatus by which the object is effected. Figure 1 is an external view of a governor reproduced from a photograph. Figure 2 is a lettered diagram, one part being shown in section, indicating the internal construction. Looking at figure 1, some idea of the compact character of the device can be appreciated on realizing that the height is only about two feet and the width at the widest part only about five inches.

It will be noticed that the left-hand side of the

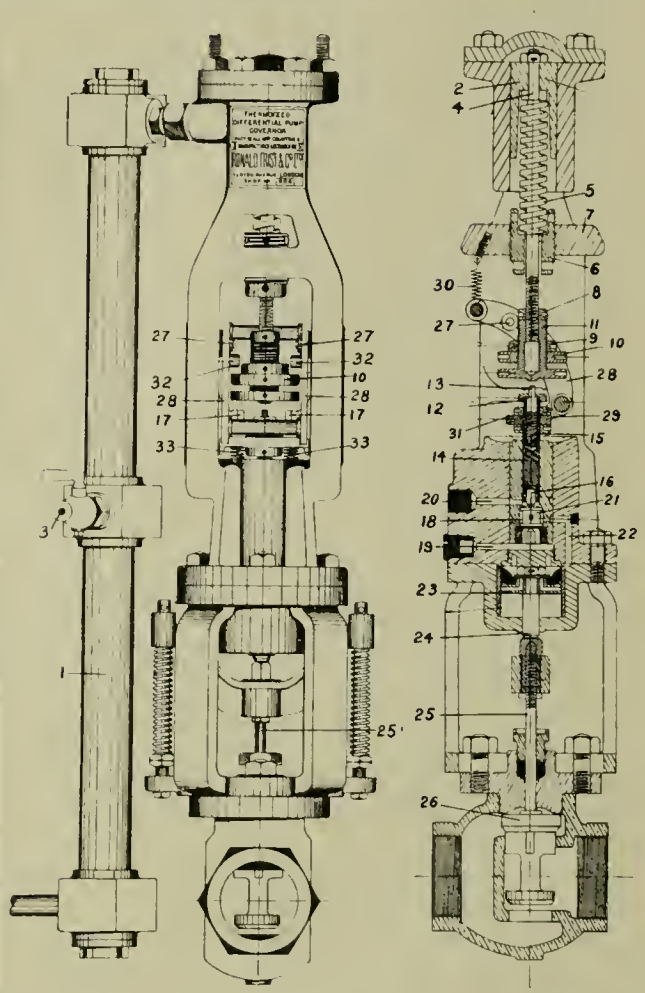


Fig. 2

device is a hollow column (1) connected to the upper part of the cylinder containing the piston (2). A small pipe leading from the main feed pipe and of about one quarter of an inch internal diameter is connected with the bottom of the column and a pet cock (3) is inserted about half-way up the column which enables the height of the water to be determined. The space above the pet cock is filled up with oil so that the water itself never comes into contact with the piston (2) or the cylinder containing it. The hydrostatic pressure obtained from the main feed pipe acts upon the piston (2) and through its piston rod (4) compresses a spiral spring (5) surrounding the rod. The spring (5) bears upon an adjustable abutment in the form of a cylindrical block (6) which screws into a projecting bridge (7) forming a part of the frame. The piston rod (4) is screwed at its lower end and has mounted thereon nuts (8, 9 and 10) provided with holes for operation by a tommy bar. The nuts, (9 and 10) are mounted upon a boss (11), which really forms the termination of the piston rod (4) and is capable of being screwed up and down on the rod and being locked in position by the nut (8). On the under side of the boss (11) is arranged a poppet piece (12) in the centre of the vertical spindle (13), disposed to slide in a suitable housing (14) and provided with a spring (15) to form a buffer in order to prevent injury to the valve

mechanism (16) should any violent movement be communicated to it by the piston rod (4), due to any erratic operation of the pump. When such action takes place, the blow from the piston rod (4) is taken by two projections (17) cast upon the frame and is not communicated to the poppet piece (12) below it, the spring (15) being merely compressed sufficiently to communicate motion to the valve mechanism (16). The valve box (18) is connected to the steam supply through the inlet (19) and to the exhaust, for example, the condenser through the outlet (20).

The valve (16) is double ended and co-acts with a block (21) mounted in the housing (14) and having two seats against which the valve can act. The centre of the block (21) has a passage which communicates with a passage (22) in the frame leading to the upper side of the piston (23), carried at the upper end of a piston rod (24), which contacts with the spindle (25) of the steam valve (26) controlling the supply of steam to the pump. Upon the frame is pivoted on the pins (27) a double lever (28), having at its lower end detent noses (29) and at its upper end a spiral spring (30) attached to the bridge piece (7), arranged so as to force the noses (29) inward toward the centre line. These noses, under certain conditions, engage the upper surface of the adjustable block (31), keep the valve (16) closed to the exhaust, and at the same time allow steam to pass through the inlet (19) to the upper side of the piston (23). Upon the levers (28) are also fixed pins (32), which contact with the upper surface of the nut (10) when the piston (2) recedes into the cylinder, owing to the pressure of the spring (5) being greater than the pressure in the feed main.

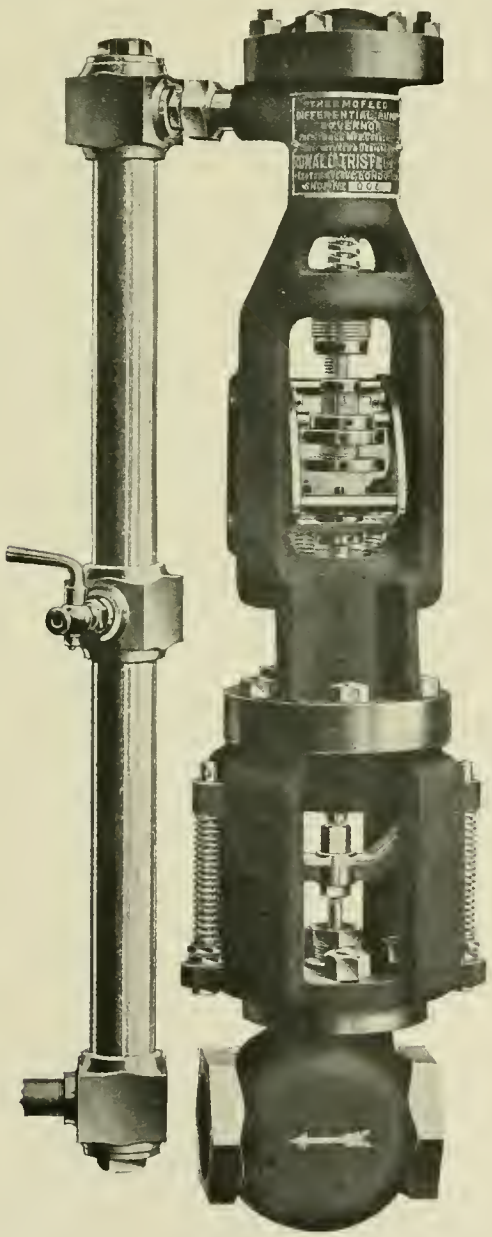


Fig. 1.

The adjustment of the device is initially effected by screwing the boss (11) up or down to a point where a given pressure of the feed water sufficiently overcomes the spring (5) as to contact with the poppet piece (12), and open the valve (16) to the steam supply through the passage (19). The head is then locked in position by screwing down the lock nut (8). The nut (10) is then adjusted on the boss (11) and is locked in position by the nut (9), so that the upper surface of the nut (10) contacts with the projecting pins (32) in order to withdraw the nose (29) from co-action with the block (31), thus allowing the valve mechanism (16) to close under the pressure of the springs (33) and thus to put the upper side of the piston (23) into communication with the exhaust passage (20). When the valve (26) is near the closed position the pressure exerted by the pump drops more or less slowly according to the demand, and the spring (5) gradually pushes up the piston (2) and lifts the boss (11) clear of the poppet piece (12). The commencement of the return movement may follow so quickly on the closing down of the valve (26) as to be almost instantaneous, but the noses (29) prevent the valve (16) from rising, so that the valve (26) remains in its closed position. The re-admission of the steam is effected by the distance the nut (10) can be drawn upward by the spring (5) so that by co-action with the pins (32) the noses (29) are drawn away, thus releasing the block (31) and allowing the spring (33) to lift the valve (16). It will be seen that the drop in pressure in the main feed pipe can be made an adjustable quantity and that the maximum pressure is regulated by the position of the block (6) and the minimum pressure by the position of the nut (10). There is no necessity to deal at any length with the detailed operation of the valve (16), piston (23) and valve (26), as the functions are quite of the ordinary character of a power device, and further the arrangement of the valve (16) is exactly similar to the control valve of the well-known Thermo-feed Regulator for Water Level Regulation in boilers.

THE head office, ship and contract departments of Messrs. Tuck & Co. are now at 61, St. Mary Axe, London, E.C. This well-known firm have branches at Liverpool, Cardiff, Dublin, Newport, Barry, Hull and on the Tyne.

MANGANESITE.—Messrs. John Hudson & Co.'s successors of Mansell Street, E., contractors to H.M. Government, have issued a neat little booklet dealing with their "Manganesite" specialities. Manganesite is used for steam, water, gas and air joints and has a good record. Messrs. Hudson will be pleased to send a copy of the booklet to anyone interested.

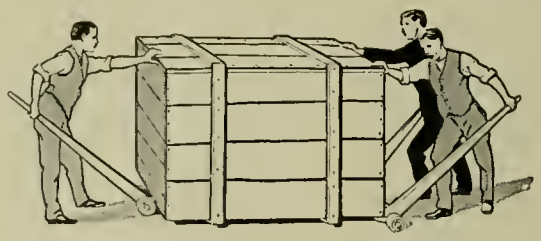
THE "HANDY" MOVABLE CROW BAR.

It is somewhat surprising that the crow bar of ancient tradition should have held its own so well up to the present day in association with odd bits of gas pipe or pieces of scaffold poles for moving heavy weights for short distances. This is now, however, to be changed by the advent of a simple and ingenious transporting crow bar, invented by Mr. R. H. Lasch, of 31, Carburton Street, Portland Road, London.

This novelly is illustrated in the accompanying diagram, as also are the methods of handling goods according to the new and old means. As will be readily seen the device consists of a crow bar with a curved wedge-shaped end, having a pair of wheels disposed on the two sides of the bar, so that when the load is taken on the bar, or rather a series of bars, it can be readily moved along the ground.

It is claimed that the device saves enormously in time and labour, it prevents accidents and breakage, as it cannot slip like the ordinary bar, it avoids the necessity and consequent trouble of putting cases and heavy bodies on trucks and obviates the necessity of the use of round tubes or rollers. It will be noticed that the transporting operation can be effected either by pulling or pushing, or both.

The old method of handling goods.



The "handy" Crow Bar in use.

SHIPPING EXHIBITION.

THE arrangements in connection with the Shipping, Engineering and Machinery Exhibition appear to be well in hand, and the promoters are using every endeavour to ensure that success which an exhibition embracing the interests involved should command. It is now announced that Prince Louis of Battenberg has consented to open the Exhibition, that Sir Archd. Denny, Bart., has been unanimously elected as chairman of the organizing committee, with Mr. Luke—one of the organizers—as secretary. It is gratifying to note that the preliminary work has been brought to a state which augurs well for the accomplishment of the end in view, and as well wishers of all organizations, having in view the advancement of the mechanical industries with the resulting advancement of trade and commerce, we hope that every encouragement may follow the footsteps of the committee. Reference has previously been made to the interest taken by the Netherlands Government, and at the general meeting of the committee, when representatives were present, some excellent comments were given on the subject of the value on peace and friendship among nations accruing from such assemblies, met for the purpose of upholding the dignity of industrial work and its bearing upon international life. The history of shipping is of great interest to those who have given attention to the study of it, and many works have been written to meet the natural desire of seafaring communities, but illustrations and models serve to show the sequence of progressive steps, and it is hoped that an educative section will form a portion of the Exhibition for the benefit of those who have read —that they may the better understand, and of those who have not had the opportunity of reading —that they may be interested to take advantage of an opportunity to read the history of ships, shipping and commerce—subjects vital to a maritime nation. This aspect of an exhibition appeals to us in relation to the rising generation and the value attaching to it from an educational point of view, and while the historical portion is of value, the most modern and latest improvements exhibited by up-to-date firms of shipbuilders, engineers and manufacturers have an additional value, both to the junior and the senior engineer, with the further value that a display of machinery and all the accessories invented and designed for increasing efficiency or saving labour, enables shipowners and their representatives to determine the probable advantages to be derived from their adoption. The following firms have already booked space at the Exhibition :—

The Acetylene Corporation, Ltd; The Acetylene Illuminating Co., Ltd.; Adnil Electric Co., Ltd.; Ailsa Shipbuilding Co., Ltd.; Allen & Simmonds, Ltd.; The Art Metal Construction Co., Ltd.; Aspinall's Patent Governor Co.; The Atlas Preservative Co., Ltd.; Babcock & Wilcox, Ltd.; Sir W. H. Bailey & Co., Ltd.; Beckett, Laycock & Watkinson, Ltd.; Blohm and Voss; William Boby; The Bonecourt Surface Combustion Co., Ltd.; Isaac Braithwaite & Sons (Engineers), Ltd.; Brampton Bros., Ltd.; The British Oxygen Co., Ltd.; The British Vacuum Cleaner Co., Ltd.; Bromell Patents Co., Ltd.; Joseph Brundrit; Carbic, Ltd.; Louis Cassier Co., Ltd.; Cayzer, Irvine & Co., Ltd.; F. R. Cedervall & Söner; Chubb & Sons (Lock & Safe Co.), Ltd.; The Citroen Gear Co., Ltd.; Clerkenwell Plating Works; The Coventry Chain Co., Ltd.; Sherrard Cowper-Coles; "Daisy" Vacuum Cleaner Co., Ltd.; Davidson & Co., Ltd.; The Delta Metal

Co., Ltd.; The Diamond Blower Co., Ltd.; Davey and Co. (London), Ltd.; J. Downton & Co., Ltd.; The Electric Appliances Co., Ltd.; Elkington & Co., Ltd.; "Engineering"; "The Engineer"; Fastnut, Ltd.; Feld Bros. & Co., Ltd.; The Felt & Tarrant Mfg. Co.; Fireproof Doors, Ltd.; Frahm Anti-Rolling Tanks Agency, Ltd.; Frodair Iron & Steel Co., Ltd.; The Herbert Frood Co., Ltd.; Gilbert Wood Press; Gross, Sherwood & Heald, Ltd.; W. B. Haigh, Gruban & Co., Ltd.; J. & E. Hall, Ltd.; Halsby & Co., Ltd.; R. and W. Hawthorne, Leslie, Co., Ltd.; H.D R. Welding Plant Construction Co., Ltd.; Hill, Siffken & Co.; J. Hopkinson & Co., Ltd.; E. R. Hough, Ltd.; The Hoyt Metal Co. of Great Britain, Ltd.; The Hudson Economiser Co. (1907), Ltd.; Indiarubber, Guttapercha and Telegraph Works, Ltd.; Industrial Waste Eliminators, Ltd.; The International Air Gas Corporation, Ltd.; Jacob, White & Co., Ltd.; Kater & Ankersmit; Matthew Keenan & Co., Ltd.; James Keith & Blackman Co., Ltd.; Kelvin, Bottomley & Baird, Ltd.; W. Kennedy; George Kent, Ltd.; Kirchner & Co.; John Kirkaldy, Ltd.; Richard Klinger & Co.; Kynoch, Ltd.; Lamport & Holt, Ltd.; Linde British Refrigeration Co., Ltd.; Lips, Ltd.; Frank Livett & Son; Locomotive Superheater Corporation, Ltd; The Magic Appliances, Ltd.; Major, Robinson & Co., Ltd.; Marconi's Wireless Telegraph Co., Ltd.; "The Marine Engineer and Naval Architect"; Matthews & Yates, Ltd.; Maxa, Ltd.; Wm. McGeoch & Co., Ltd.; The Mechanical Hammer Co., Ltd.; Medway's Safety Lift Co.; The Messer Engineering Co.; H. & W. Nelson, Ltd.; W. T. Nicholson & Clipper Co., Ltd.; Ozonair, Ltd.; "Page's Engineering Weekly"; Parsons' Marine Steam Turbine Co., Ltd.; Patent File & Tool Co., Ltd.; Henry Pels & Co.; Pinchin, Johnson & Co.; Power Plant Co., Ltd.; The Precision Engineering Co., Ltd.; Ramsay's Marine Engineering Co., Ltd.; Rhineland Manufacturing Co., Ltd.; H. E. C. Robinson and Co., Ltd.; Arthur Ross, Hotchkiss & Co., Ltd.; Royal Mail Steam Packet Co.; Rudman, Lancey and Craven, Ltd.; Samuel Bros., Ltd.; The Saver Clutch Co., Ltd.; Schmidt's Superheating Co., Ltd.; Shaw-Walker, Ltd.; "Shipbuilding & Shipping Record"; Siebe, Gorman & Co., Ltd.; Sirius Autogenous Works Co.; Thomas Smith & Sons, of Saltley, Ltd.; Steamship Specialities Supply Co.; L. Sterne & Co., Ltd.; Stothert & Pitt, Ltd.; The Sunderland Forge and Engineering Co., Ltd.; Syren & Shipping, Ltd.; W. C. Tackley & Co., Ltd.; Telford, Grier & Mackay, Ltd.; Temple Press, Ltd.; Thomas & Bishop; Thorn and Hoddle Acetylene Co., Ltd.; Transport, Ltd.; Trinity House, London, E.C.; Union-Castle Mail Steamship Co., Ltd.; Archibald Vickers, Ltd.; James Walker and Co., Ltd.; Wallach Bros., Ltd.; Welin Davit and Engineering Co., Ltd.; John Wigham & Son; "The Yachting Monthly"; Yorkshire Copper Works, Ltd.

The Royal Commission for the Dutch Section have already applied for and been allotted 10,000 square feet. They have now applied for a further 3,000 square feet.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Launching Activity.—February has, so far as it has gone, at time of writing, proved much more notable than January in the matter of ship launching on the Clyde. Although a short month there is every likelihood that the volume of output will reach 40,000 tons, if not considerably over. The figure for January only amounted to 22,270 tons, but in this case also of course the month was abreviated by the New Year holidays. Most of the vessels contributing to the February output were of large tonnage, ranging from 5,000 to 8,000 tons gross, all of the high-class cargo-carrying order. One vessel of special note was the *Mississippi*, a motor ship of 5,000 tons, launched by Messrs. Harland and Wolff, Ltd., Govan, more fully referred to in the Launch section. East of Scotland shipbuilders contributed to the Scottish output of January about 9,000 tons, and the figure for February, when definitely known, will not fall much, if any, short of this. Of the individual vessels, one of special note was the steamer *Transvaal* of 4,380 tons gross and 7,200 tons deadweight capacity, being the largest vessel yet launched on the Firth, as afterwards commented on.

Messrs. Harland & Wolff, Ltd., launched from their extensive shipyard at Govan, on February 11th, the twin-screw motor ship *Mississippi*. She is the first ship built by Messrs. Harland & Wolff to have internal combustion engines, and marks a distinct epoch as being the first ocean-going ship in which neither fire nor steam will play any part.

Messrs. A. & J. Inglis, Ltd., Pointhouse, Glasgow, have received a contract for the construction of a steamer for the Liverpool and North Wales Steamship Co. The vessel will be fitted for the conveyance of passengers, and will be propelled at a high rate of speed by Parsons' turbines working through helical gearing. The vessel is expected to be delivered at the commencement of the coming passenger season, and will be employed indiscriminately in the various branches of the Company's service. About the end of January, Messrs. Inglis handed over to her owners after highly successful, speed trials on the Clyde the paddle steamer *Cabo Corrientes*, the second of two similar vessels built to the order of the Hamburg and South American Steamship Co., for passenger service on the River Plate.

Messrs. William Denny & Bros., Dumbarton, have received from Messrs. Huddart Parker, Ltd., Melbourne, an order for a geared turbine steamer 315 ft. in length. The vessel, which is intended for the mail service between Melbourne and Launceston, will be of the high-class passenger and cargo type, with accommodation for 400 passengers, and a speed of 20 knots. The turbine machinery will be of the Parsons' type and will be constructed by the associated firms of Messrs. Denny & Co., Dumbarton.

Port Glasgow Shipbuilding Yards, which on the whole are still well supplied with work except in the case of Messrs. Robert Duncan & Co., whose stocks are at present empty, produce vessels so rapidly that the almost total absence of new orders during the past two months or so has been occasioning some misgiving. Fortunately, however, since February began a number of orders have been booked. Messrs. Wm. Hamilton & Co., Ltd., have received an order to construct a high-class cargo steamer for the Hamburg-American Line. She will be of fairly large dimensions and will be propelled by twin-screw; her engines being supplied by a Glasgow firm, Messrs. Hamilton themselves not being marine engineers. The Clyde Shipbuilding and Engineering Co., who have at present the three berths in their yard fully occupied, and a steamer to lay down, have received a further order to build and engine a screw steamer for owners for whom they have already built largely. They have also on hand a dock caisson to the order of the Admiralty for the naval station at Rosyth. Messrs. Russell & Co., whose large shipyard at Kingston contains a dozen building berths, are stated to have under construction or on their books as many as sixteen vessels, all of considerable tonnage and intended for cargo-carrying service. Several of the vessels are on the stocks in Messrs. Russell & Co.'s East Bay shipyard, Port Glasgow. Messrs. Ferguson Bros., in the neighbouring yard, have three vessels under construction.

Messrs. George Brown & Co., Garvel Park Shipyard, Greenock, have contracted to build two steamers each of 1,700 tons deadweight for Messrs. Plisson & Co., Paris and Cardiff. On February 12th the firm launched the screw steamer *Ardgour*.

Irvine Shipyards.—Satisfactory progress has been made with the laying-out and construction of the new shipyard at Irvine on the Ayrshire coast, at first understood to be the scheme of Messrs. Mackie & Thomson, but afterwards known to be the concern of Messrs. Harland & Wolff, Ltd. It is now stated that the yard will be extended by the addition of about two acres of adjacent land, and that there will also be a fitting-out berth constructed at the harbour. An application, it is understood, has been received by the town's authorities for the leasing of ground on which to establish another new shipbuilding yard. The name of the applicant has, so far, not been disclosed.

Messrs. Ramage & Ferguson, Leith, launched on February 11th the *Transvaal*, the largest steamer ever constructed at

that port. Speaking after the launch, Mr. John Ferguson, managing director of the building firm, said that, as briefly announced about the middle of December, they had settled with the East Asiatic Co. to build the largest sailing vessel ever constructed in Scotland. She would have five masts and would carry an area of 53,000 ft. of canvas. Her deadweight capacity would be 5,000 tons. She would have a Diesel oil engine, which would drive her in calms at 7 miles per hour.

Messrs. The Dundee Shipbuilding Co., at the latter end of January, received the contract to build for Danish owners a steam collier 240 ft. in length, also for two trawlers for Hillyer's Steam Fishing Co., Hull.

The Caledon Shipbuilding Co., Dundee, have recently put through speed and other trials the motor vessel *Sabastian*, which they launched on April last, and described in the June issue. On a 24-hours' loaded trial the speed attained was 11 knots, or about three-quarters of a knot above the contract.

Wireless on Boardship.—The installation of apparatus for wireless telegraphy has now been effected on board most of the steamers owned and managed by Messrs. P. Henderson and Co., Glasgow, this work having been done by Messrs. Siemens Bros. & Co. The vessels already fitted include the *Tenasserin*, *Bhamo*, *Martaban* and *Henzada*. The steamers *Irrawaddy* and *Chindwin* will also shortly be equipped. The installations are on the "quenched spark" system, for which system it is claimed that it is a great improvement on the "open spark" system, which has been adopted by many owners. The source of energy in Messrs. P. Henderson & Co.'s vessels is a motor-generator set, and in the case of the first three vessels the guaranteed communication over the open sea and under usual working conditions is 140 miles by day and 240 miles by night, but already ranges up to 660 miles by day have been obtained with these sets. The steamer *Henzada* has been fitted with a large size motor-generator set, the guaranteed ranges being 200 miles by day and 330 miles by night. A similar installation is to be installed on the *Chindwin*. Wireless telegraphy on board ocean-going ships has now become almost as much a matter of course as the fitting of propulsive machinery, or of compasses, and further evidence of the spread of the system is afforded by the fact that even the lifeboats carried on boardship are being equipped with efficient apparatus. What is claimed to be the first British motor wireless lifeboat has recently been supplied to the new Dalmuir-built Allan liner *Alsatian*, which left Liverpool on her second voyage to Canada on February 14th. The boat is 28 ft. in length by 8 ft. beam, and supplied with a four-cylinder Gleniffer paraffin motor. Her most striking feature, however, is a complete wireless installation having a range of 100 miles. The motor power gives the boat a speed of nearly 7½ knots and enables it to tow eight or ten ordinary boats in a moderate sea. The new Cunard liner *Aquitania*, at present fitting out at Clydebank, is also to have two motor lifeboats, which will carry installations of wireless telegraphy.

Engineering Exhibition at Glasgow.— The Museums and Art Galleries Department of the Corporation of Glasgow is organizing a loan exhibition of engineering models, appliances and apparatus, to be held in the Kelvingrove Museum from May till December next. The exhibition is to consist of memorials of eminent engineers and inventors, with models, drawings and other illustrations of their inventions and discoveries; appliances, tools and drawings relating to general mechanical engineering, railway and automobile engineering and aeronautics. There will also be an "artisans' section," which will include contributions under any of the former headings by bona-fide workmen. In this special section awards of medals and certificates of merit for ingenuity and excellence of workmanship will be granted. Working models will be shown in motion, as far as possible.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, have a large amount of work on hand. The twin-screw geared turbine steamer for the Federal Line of New Zealand will be over 10,000 tons deadweight and maintain 13 knots on service. The Furness liner, previously reported, is a sister ship to two steamers building by the Northumberland Shipbuilding Co., and will indicate about 4,000 i.h.p. at 12½ knots. These are reported as being built for the Canadian combine, of which Sir Stephen Furness is a director.

Messrs. W. Harkess & Co., Ltd., are busy on both old and new work, and are reported to have secured the contract to build a small cargo boat, sister boat to the s.s.'s *Pomeron* and *Norton*, belonging to Messrs. Furness, Withy & Co.

Messrs. Smith's Dry Dock Co., South Bank, are very busy in all departments, building, dry-docking, repairing and overhauling a large amount of various kinds of tonnage. They are reported as having given a large order for small boilers to Messrs. Richardsons, Westgarth & Co.

Messrs. W. Gray & Co., of West Hartlepool, are actively engaged on the opposite side of the river laying out a large shipyard for the construction of steamers up to 800 ft. long that they cannot build at their other yards. Eventually two dry docks are likely to be constructed, but at present they are simply preparing and laying out the ground. This enterprise will ultimately greatly benefit the port of Middlesbrough.

Messrs. Richardsons, Westgarth & Co. Ltd., continue very busy in all departments. During last year they made and installed a large number of medium water-tube boilers which have been very successful. They are also very busy in the marine boiler department, having several large contracts on hand, which are expected to keep them busy throughout the year. They have secured the contract to supply the engines and boilers of the Canadian boat building by Sir Raylton Dixon & Co., also the engines and boilers for a small cargo boat building by the North of Ireland Shipbuilding Co.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co., continue very busy and expect to secure the contract to build a medium-sized steamer they are tendering for that is in the open market for a West Hartlepool firm.

Messrs. Richardson, Duck & Co. report nothing new during the month. They are likely to secure the order for a cargo steamer for early delivery.

Messrs. R. Ropner & Son have a good amount of work on hand, both for home and foreign account, which will keep them busy for some time. No new work is reported.

Messrs. Blair & Co. have a large amount of work on hand, principally for steamers building locally. They have secured the contract to supply the engines and boilers for a cargo steamer building on the Tees.

West Hartlepool.

The Trechmann Steamship Co., Ltd. (Messrs. Trechmann Bros., managers), have sold the s.s. *Kivra*, ex *Cadiz*, of 2,083 gross tons, for £15,000, to Cia Anonima Maritima "La Actividad," Bilbao, who have rechristened her the s.s. *Cristina*.

Messrs. W. Gray & Co., Ltd., have a large amount of work on hand which will keep them very busy throughout the year. No new orders are reported during the month. Several steamers are repairing, also the overhaul of the ss. *Wavelet*, of Messrs. Needham Bros.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Harbour Dockyard, have booked an order for a medium-sized cargo steamer for Messrs. Furness, Withy & Co. for early delivery. They are very busy in the docking department.

The Central Marine Engine Works of Messrs. W. Gray and Co. are very busy in every department. They are contemplating re-organizing their works and extending so as to cope with the extra work which they will have to turn out for their new yard at Seaton Snook.

Hartlepool.

Messrs. Richardsons, Westgarth & Co., Ltd., continue very busy and have engaged Mr. Guthrie, Glasgow, as assistant manager of their turbine department, in place of the late Mr. Willis, deceased. They are very busy upon early delivery orders. Two cargo steamers being built by Messrs. Irvine's will be supplied with the engine and boilers by them.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Middleton, are full up with work till about September. They have recently booked an order for a medium-sized cargo steamer for Messrs. Furness, Withy & Co., about 380 ft. long, for their general trade.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Hull Shipping.—The trade of the port has not been up to the usual high level expected at this time of the year, and coal shipping has dropped to a low point. The various docks are now having the quay's sides cleared of the great quantity of pit props, etc., and this has been a great task for the railway companies.

Quick Despatch.—The s.s. *Port Augusta*, of the Port Line, London, arrived from Australian ports with 9,791 bales of wool, too late for the tide to get into dock. She was ordered to the new River Side Quay ; this is the first instance of such a large steamer coming along the Side Quay, and in view of the excellent results the experiment is looked upon as eminently satisfactory. The time taken to discharge was fifteen working hours, or at the rate of over 600 bales per hour. The bales were handled direct into the N.E. Railway trucks on the quay and despatched to Bradford.

A number of the local passenger cross channel steamers are undergoing repairs, etc., and Board of Trade Surveys for the approaching summer passenger season.

Obituary.—Mr. Arthur V. Williamson, aged 48, chief engineer of the s.s. *Otto*, Wilson Line, when about to enter the engineering departments office on the 13th February, was seen to drop down. A doctor was immediately sent for, and on his arrival pronounced life extinct. Mr. Williamson was in the Wilson Line for many years, entering the firm's employ as a junior engineer, and he was greatly respected by all engineers sailing out of the port.

Armed Liners.—The Wilson Line, in conjunction with the Admiralty, are arming several of their liners with 4·7 quick-firing guns; the liners that are being equipped are the s.s. *Francisco*, 4,760 tons, s.s. *Idaho*, 4,900 tons, s.s. *Colorado*, 6,000 tons, now fitting out at the builder's yard on the Clyde. Delivery is expected this month and provision is being made to mount the guns in her stern ; she will carry them on her maiden voyage. The quick firers on the Wilson liners are for defensive purposes only ; the guns are only fitted to work in an angle of 20 degrees, and would only be used when pursued. Each liner will be provided with a magazine for the cordite, with gunners' stores and shell bins, and each will carry a number of rounds of ammunition. The Wilson Line have building at present, s.s. *Guido*, s.s. *Destro* and the s.s. *Gannizaro*. This Company has a well-equipped school for training young cadets; they are well drilled and present a fine appearance when seen marching from the school premises. They are drilled and schooled under able men from H.M. Navy, and the firm deserves great praise for encouraging young men to go to sea.

Presentation to Mr. John Sawyer.—A very quiet, but interesting, presentation took place on the 20th January, when Mr. Sawyer, who recently retired from the position of assistant superintendent engineer of the Wilson Line was the recipient of a mark of esteem and respect from the engineers of the fleet. The present consisted of a solid silver salver, two fruit dishes, and a gold mounted malacca cane, each being suitably engraved. Owing to indisposition Mr. Sawyer had been unable to leave home for some days, so that a public recognition of this appreciation of the engineers was impossible, and in consequence four of the senior chief engineers of the Company were deputed to represent their colleagues and to express their feelings towards Mr. Sawyer, and their wishes for his future good health and enjoyment of a well-merited retirement from active work. This duty fell to Mr. G. Grace, of the s.s. *Sultan*, Mr. F. Heseltine, s.s. *Marengo*, Mr. J. Woodhouse, R.M.S. *Aaro*, and Mr. J. Milne, R.M.S. *Eskimo*, who waited upon their late superintendent at his home. Since the year 1871 to the later part of 1913, a period of over forty-two years, Mr. Sawyer has occupied the responsible position of assistant superintendent engineer, during which time he has always retained the respect and affection of those under his control. This was shown by the spontaneous manner in which all responded when it was proposed to exhibit this feeling in a tangible form. In acknowledging this mark of respect from the engineers, Mr. Sawyer revived memories of many pleasant incidents in the many years he had been associated with them and asked the deputation to convey his sincere thanks and appreciation to the engineers, as it was impossible for him to meet them individually.

Earle's Shipbuilding and Engineering Co., Ltd., are building three new steamers for the Ellerman Lines of Liverpool, also one new steamer for the Wilson Line, besides other small steamers, The firm's patent slips are well employed with repair work. The new manager, Mr. Nicholson, late of Leith, is now in charge of the yard.

Amos & Smith, Ltd., engineers and boilermakers, are keeping fairly busy with new work and repairs, the machine shop is running night and day to compete with the orders in hand. The outside staff is very busy on two local steamers going under heavy repairs for Lloyd's and British Corporation, The firm is also busy fitting machinery on new trawlers and preparing for trial trips before being handed over to their new owners. The branch shop, Alexandra Dock, is also kept fully employed with repair work and opening out machinery and boilers for surveys. The prospects for the year seem very good.

C. D. Holmes, Ltd., engineers and boilermakers, are very busy building engines and boilers for trawlers, and the machine shop is working night and day. A number of powerful trawl winches are also being built. The branch works at Alexandra Dock are kept fully employed with general repairs on the different steamers in the docks, and the outside staff, fitting engines, boilers and auxiliary machinery on board the trawlers at Queen's Dock, and preparing for trial trips.

Thomas Tate, Clarence Engine Works, is fully employed on repair work on coasting steamers, local tugs, etc.

North-East Coast Engineering Works (Hull), Ltd., have been very busy during the month on the following steamers : s.s. *Alexandra*, s.s. *Cornella*, s.s. *Orion ;* the first-named vessel has gone under very expensive repairs, including thirty new shell plates renewed, and engines thoroughly overhauled and repaired ; s.s. *Cornella* put in graving dock and tail shaft drawn, etc. ; the s.s. *Orion* has undergone the usual run of engine repairs. Several steamers have been put in graving dock for painting, etc.

Stewart & Craig, engineers and ship repairers, had a fair amount of work during the month on the following steamers : s.s. *Glencoe*, s.s. *Signi*, s.s. *Amie Therese*, s.s. *Ferdinand Nelson*, s.s. *Skandia*, s.s. *Sterling*, s.s. *Winterton*, sailing ship *Bellgladi*, new rudder and stem, and new bowsprit and rigging. S.s. *Glencoe*, fitted new donkey boiler and new funnel, etc. ; s.s. *Signi*, extensive repairs to bunkers ; s.s. *Amie Therese* and other steamers mentioned have had general repairs.

Woodall & Co., engineers.—Ship repairs for this firm have been rather quiet lately, but the smith's shop is kept fully employed with orders from L.C.C. and Hull Corporation, and with orders from small shipyards throughout the country for stems and stern posts.

Central Dry Dock, Ltd., have been fairly well employed with graving dock work and with different steamers in the various docks.

Cochrane & Sons, Ltd., shipbuilders, Selby, are exceedingly busy and have a large number of contracts in hand for trawlers, drifters, coasters, etc., for Cork, Fleetwood, Boulogne, Grimsby and Hull.

G. Scarr & Sons, shipbuilders, Hessle, are fairly busy building light ships for the Hull Conservancy and lighters for local owners.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

The Southampton Harbour Board.—Seven seats on the Harbour Board have been allotted to members of the Borough Council, and the nominations took place recently. The majority of the members of the Board have been in the past those who were connected in some way or other with the Borough Council, but a reconstruction of the allocation of seats has taken place. The Chamber of Commerce has been given two seats, for which there are five candidates. The foreign shippers have been allotted four seats, which will doubtless be filled by representatives

of the American Line, the R.M.S.P.Co., U.C.M.Co., and the Cunard Co. The seat for the representation of the interests of the waterside frontagers is to be contested by Mr. A. J. Day, J.P., and Col. E. Bance, V.D., D.L., a former Mayor of Southampton and chairman of the Board. The coastwise shippers are allotted two seats. The following appointments have already been made:—Colonel Willan, Hampshire County Council, Colonel A. B. Hamilton, embarkation officer, Admiralty, Capt Crawford, C.B., Trinity House, and Mr. T. M. Williams, docks manager. Capt. Harvey, assistant dock master, and Mr. S. W. Milford, L.&S.W. Railway Co.

Southampton.— The Hamburg - South American Co.'s *Cap Trafalgar* is expected to leave Hamburg on the 10th of this month and will be in Southampton on the 11th. Prince and Princess Henry of Prussia are going out in the vessel on this her maiden voyage. It is understood that the vessel will be an advance upon the *Cap Finisterre*, which was acknowledged by all to be sumptuously fitted out.

A rumour gained currency last month to the effect that the R.M.S.P.Co. were negotiating with the Ocean Coal and Wilson's, Ltd., with a view to linking all up under the control of Sir Owen Philipps. This rumour has been contradicted by Sir Owen, who said that none of the shipping companies with which he is concerned are connected with any such scheme

Last month very rough weather was experienced, not only in the Atlantic, but in the Channel, and vessels sailing to and from the port used the East passage round the Isle of White in preference to the Needles passage. The *Olympic* encountered very severe weather. A tremendous sea broke several port lights and flooded the saloon floor. The flying glass caused injuries to some of the passengers.

Messrs. J. I. Thornycroft & Co. completed the big repair job on the s.s. *Izaston* last month. This was a very big contract and secured in the face of keen competition with firms all over the country.

Messrs. Harland & Wolff are busy with work in connection with the machinery on the French liner *La France*.

R.M.S.P. Co.—On the 11th of last month the Caledon Shipbuilding Co. launched the twin-screw inter-colonial steamer *Barima* for the R.M.S.P.Co. She will shortly be followed by a sister vessel, the *Belize*. These vessels will replace two on the Company's inter-Island services and will be replete with all up-to-date appliances. The R.M.S.P. Co.'s new triple-screw steamer *Alcantara* was expected to have sailed from Southampton on her maiden voyage next month, but according to local journals she will not sail until the summer. She will be the largest vessel engaged on the Company's Brazil and River Plate service. She is to be followed by a still larger vessel, the *Almanzora*, which is not expected until 1915.

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight. —H.M.S. *Laurel*, the first of the two torpedo-boat destroyers this firm are building to the 1912-13 programme, has completed her official trials and is receiving her final painting before being handed over. The sister vessel, H.M.S. *Liberty*, is running official trials. The third and fourth destroyers named respectively *Almirante Simpson* and *Almirante Goni*, which are building for the Chilian Government, are nearing the launching stage. The fifth and sixth vessels are in hand and the engine works have several large sets of Diesel engines going through the various departments.

THAMES.

(From our Own Correspondent.)

Shipping Co.'s Reports.—The Houlder Line has recently held its annual meeting, which is of a very favourable character, the profit being the largest ever made by the Company, being 50 per cent. more than that for the previous year at the figure of £142,058. The Mercantile Steamship Co.'s report is a satisfactory one, there being a profit after paying all expenses of £115,596, making 20 per cent. for the year 1913. The freight markets are given as not being so favourable for the last six months as in the earlier period.

The Eagle Oil Transport Co., formed as its name implies for the purpose of carrying oil, has had eight vessels delivered during the year, making a total of eleven, with two more to follow immediately, and a further six before the end of June. The gross earnings were £80,900, which after allowing for depreciation and paying the preference dividend admits of £9,200 being carried forward, and these results were obtained with less than a quarter of the tonnage which will be available when all the vessels are completed.

Mail Lines Finance.—In this department there has been further great demand for P. and O. shares and large rises in the stock price, which changed hands at 323, the movement being as much as 20 points. No other Shipping Co. responded to the same extent. The Royal Mail Co. is reported to be contemplating other acquisitions, but this time in the colliery interests in South Wales, but their shares did not fluctuate to any great extent though there have been slight movements in value.

The Late Sir F. Mirrielees.—This gentleman, who retired from the position of senior partner of the Union Castle Line in April, 1912, died recently at the age of 63. He was the son-in-law of the founder, Sir Donald Currie, and had had a connection of over thirty years with the firm.

The Royal Victoria Dock.—Notice has been given by the Port Authority that during the repairs to the lock at the western entrance of this dock that the swinging of the bridge there will be for an hour and a quarter at high water, and notice will be given as to the times of high water to avoid inconvenience as much as possible to the shipping trade.

The New Thames Training Ship.—The vessel leased from the Admiralty, which will shortly lie opposite the Temple Pier, will be as a memorial to the late Marquis of Northampton. The vessel will be used as a training ship, with workshops and recreation rooms on board for boys, and the management will be in the hands of the Compton family and the vessel named after the late Marquis.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

AMONGST the varied types of vessels constructed at the Birkenhead yard of Messrs. Cammell, Laird & Co., the most important during recent years probably, is the Train Ferry and Ice Breaker for the Transcontinental Railway Co. of Canada, for the Quebec Levis Service. This vessel, which is now being completed in the wet basin, will be found described in our February issue.

Messrs. Cammell, Laird & Co.—Great activity prevails upon the new Admiralty work now in hand by this firm. The keel of H.M. light cruiser *Caroline* was laid on January 29th, whilst the machinery for the *Caroline* and her sister ship *Cleopatra* building at Devonport are well in hand. Great interest centres in the two geared turbine steamers for the Argentine Steam Navigation Co. for the Buenos Ayres—Monte Video traffic. The decorations will be of the very highest class and will be very luxurious; the whole of the decorations and woodwork will be carried out by the builders. The turbine gearing will also be cut by the builders, special machinery having recently been installed for this purpose. The P. and O. steamer *Khyber* is about to be delivered at time of writing, whilst the remaining two of the four sister vessels are well on towards launching. The repair department has had the Canadian Northern *Royal George* in hand for annual survey. The Nourse liner *Ganges* and the Houston liner *Homereus* have been under repair. The North Wales steamer *St. Elvies* has had new boilers and other repair work carried out, whilst the *Trojan Prince* of the Prince Line is about to be taken in hand. Various reboilering contracts have also recently been executed. Mr. J. S. Gillingham, R.C.N.C., M.I.N.A., who has been stationed in Birkenhead for the past three years and has had the supervision of the hull work of H.M.S. *Audacious*, is about to take up an important position at the Admiralty. The Mersey side will lose in Mr. Gillingham a general favourite.

Messrs. H. & C. Grayson—A distinctly novel departure in ship repairing has recently been made by this enterprising firm of long established ship repairers and engineers. Some

months ago they secured the famous whaler, *Diana*, of Dundee, sister ship to the ice scout ship, *Scotia*. Messrs Grayson have fitted this vessel up with all the latest appliances for both ship and engine repair work, in fact a floating shipyard and engineering works in miniature. Due to the great prosperity of the Port of Liverpool, Messrs. Grayson have found it impossible at times to obtain a quay berth for vessels under repair afloat. Heavy weights have thus had to be transported to vessels lying out some distance in the river. This vessel, which has been renamed the *Grayson*, has compound engines, supplied with steam from two boilers, one of which is capable of driving the vessel at a speed of 9 knots, thus giving a large reserve of boiler power. The plant installed consists briefly of the following: One 50 kilo-watt electric generator, for power for the machinery and lighting; one ditto for electric welding purposes; air compressor plant, capable of working twelve pneumatic drills; motor-driven punching press; one ditto countersinking machine, with swing jib; one motor-driven punching press, two direct motor-driven lathes, one double-geared vertical pillar drilling machine, also a portable electric saw, which can be used in any position. A powerful steam winch and two large derricks with gear are fitted. A steam warping capstan is fitted at the aft end and steam quartermaster is also fitted. Whilst this vessel is intended primarily for use in the Mersey, she will be quite capable of going to Holyhead or any of the coast ports, or for salvage purposes.

At the annual meeting of the Manchester Steamship Owners' Association recently held in Manchester, Mr. A. C. F. Henderson presiding, an important report was presented dealing with the progress of the Ship Canal and Port generally. The figures for 1912, which are the last complete yearly figures obtainable, show that 5,702 vessels made use of the canal, giving a traffic tonnage of 5,339,884. The returns show Manchester to be second in the Cotton and Oil Trades, third in the Fruit Trade and fourth in the total value of Imports and Exports, while it is fifth in the Timber and Grain Trades. When the new grain elevator is complete there will exist grain storage for 80,000 tons. One half of the total Egyptian Cotton Crop imported into this country passes through the canal.

Cunard Line.—The *Aquitania* is expected to enter the Liverpool—New York Service in June next, when she will be commanded by Capt. W. T. Turner, R.N.R. Capt. Turner will be succeeded in the command of the *Mauretania* by Capt. J. W. T. Charles, C.R., R.D., R.N.R. who has been transferred from the *Lusitania*. The immense new offices for this Company which are being constructed on the river front, between the Dock Board offices and the Royal Liver Buildings are being rapidly advanced, the foundation and basement being well in hand.

The Isle of Man.—The Admiralty have decided to erect a signalling station at Ramsey for use in connection with warships passing to and from the main roadstead of the Irish Channel.

The Port of Liverpool.—At a recent gathering of the Liverpool Shipping Staffs, Mr. Alfred Chandler, General Manager of the Mersey Docks and Harbour Board stated that in 1913, 14,670,000 tons of shipping entered the port. Of the total trade of Great Britain, London had 28·36 per cent., but since this included about 4,000,000 tons accounted for by Queensborough, he claimed that Liverpool with its 28·3 per cent. held the premier position and was in fact the first port in the World, at any rate in the Eastern Hemisphere.

The Allan Line.—The Allan Line who have a reputation as pioneers have gone ahead of the Board of Trade regulations and are fitting a motor lifeboat to the *Alsatian* and *Calgarian*. This small craft is 28 ft. long, has a beam of 8 ft. and is housed in for half her length, while a self-draining cockpit aft provides accommodation for the helmsman. The material is mahogany and teak. A four-cylinder Gleniffer paraffin motor gave the vessel 7½ knots during her trials which were carried out in half a gale. Two masts and oars are provided besides a complete lifeboat kit, while a complete wireless installation is also fitted whose range is 100 miles. From eight to ten ships' boats can be towed in moderate weather.

Marine Engine Control.—On February 5th, in the Brocklebank Dock, Liverpool, an important demonstration was given on board the T.S.S *La Negra*, 10,000 tons, and owned by Messrs. The British and Argentine Steam Navigation Company, of the Marine Engine Auto Control. For some considerable time the main engines were operated by the control, which is connected directly to the engineers reply telegraph or to bridge in case of sudden emergency. The special features demonstrated were the instantaneous response of the engines to the order on the telegraph, the impossibility of the Engine moving otherwise than as ordered, also an indication to the bridge of the direction of engines. Mr Willett Bruce, of the White Star Company, and representatives for the Cunard, P. & O., Alfred Holt, C.P.R. and other companies, also Lloyd's Register were present. The gentlemen present expressed keen interest and satisfaction with the very satisfactory results obtained under real working conditions.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There is a very brisk tone in the shipbuilding trades of this district. Builders are thronged with work, and some of it has been delayed in completion by reasons of labour difficulties and by a shortage of men in several of the skilled trades. But a very decided effort is being made to push on with all the orders in hand in the hope of making way for contracts which are likely to follow so soon as builders are able to accept them. In recent years there has been a speeding up of construction, and it has been discovered that ships built in the shortest time are able to earn their owners a deal of money before that would be possible if the old delays continued. Messrs. Vickers have put down plant which not only economizes labour, but which makes it possible to give delivery of vessels under contract in a much shorter time than was formerly the case. This is shown in the building of a gigantic warship in less than a couple of years, finished and complete for service. The system of premium bonus has also enabled builders to get out much more work in a given time than was usual formerly. It is now possible to have in hand even three large warships and to produce these in as quick a time as one warship was built in, a few years ago. Of course, such a thing is only possible in a big yard like that of Messrs. Vickers at Barrow, where three Dreadnoughts are at present under construction.

Settlement of a Wages Difficulty.—It is with great satisfaction that the public learned the other day that engineers employed by Messrs. Vickers, Ltd., had come to terms as to the increase of wages they demanded. The first demand was for an increase of 6s. per week on the 36s. already paid. The masters in the first instance agreed to give the men an advance of 2s. per week, and made it clear that if the eight-hours day was conceded by the big engineering firms of the country this would not be raised as a point of reducing their earnings. The men refused this offer by a very large majority, and later on the masters improved their offer in wishing to give their men another 1s. advance at the beginning of October next. The men accepted these terms by 1,446 votes to 523, a majority of 923. The people of Barrow were immensely pleased when they heard this result, as the prospect was there would be a prolonged strike at a time when work is so plentiful. There are about 3,000 engineers employed at the Barrow yard, and a very large number of labourers in connection with them, and a strike would have meant a stoppage of nearly 5,000 men. The increase will mean an addition of about £450 a week to the wages list, or about £23,000 a year, which is a large figure to add to the expenses of even a very big firm. The firm have in hand a very great deal of work, and know they are likely to get many more orders as soon as they know they can deal with them.

Russian Armaments.—A rumour gained currency during the month that Messrs. Krupp, of Essen, Germany, along with Messrs. Vickers, Barrow, were in treaty to join the Russian firm of armament makers at Putiloff, in Russia, with the view of putting that concern on a more up-to-date footing. To begin with, the French people created a scene on this question, and the Russian Government was approached with the view of putting a stop to any connection with Russian armament firms with Germany, and the Government at once protested against any such movement. The question remains as to whether the Vickers firm will be

brought in in regard to this proposal. It is known that they have already been granted a concession in regard to the armament works at Tsaritzyn, which establishment is to be modernized so as to be quite up to modern requirements, and of course, Messrs. Vickers are already busy building warships for Russia at Nikolaeiff on the Black Sea. No official denial has been made by the Vickers Co. as to their connection with the improved Putiloff works, but as their foreign enterprise has been very great during the past few years it is thought probable they may be negotiating to take some further share in bringing Russia up to a higher naval standard than she has occupied for a long time past.

Big Canadian Enterprise.—It is known that Messrs. Vickers, Ltd., have lately associated themselves with big Canadian enterprises at Montreal and along the big lakes. It is now intimated they have bought up about twelve shipping companies which do a large business in the navigation of the Lakes and in the trade in shipping along the American coast. They are associated in a new enterprise under the Canadian Steamship Lines, Ltd., with the firm of Messrs. Furness, Withy & Co., and other big firms having considerable interest in shipping business to take over these lines of steamships, and it is evident the intention is to develop these carrying trades, which will probably mean the securing of orders for their new Canadian shipyards.

Progress of Work.—Although no new orders are reported to have been placed during the month the progress of work in the big establishment at Barrow has been very well maintained. There is a big rush to complete the battleship *Reshadieh* for the Turkish Government as quickly as possible, as delivery is urgently wanted, and there is also a very big body of men employed in the fitting up of the British Dreadnought *Emperor of India*. These vessels are lying alongside each other in the Buccleuch Dock, and night and day shifts of men are employed on them. The work of building the new battleship *Revenge* for the British Government is going on very satisfactorily, and progress is being made with the light cruisers *Phaeton* and *Penelope*. The sides of the big oil carrying oil-driven *Olympia* are beginning to lift themselves, and attention is being paid also to the construction of the new section of the Brazilian floating dock. In the submarine department the second submarine built for the Australian Government has been delivered to Portsmouth, where she has joined *A.E.*1. Both of these vessels will be convoyed by a British man-of-war to Singapore, and there they will be taken in hand by an Australian warship. The submarines will travel a great part of the way with their own heavy oil engines. Many more submarines for the British Admiralty are in progress of construction at Barrow.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff, Ltd.—The first launch of the year from the Queen's Island took place on 29th January, when the magnificent triple-screw liner *Euripides*, described on another page, left the ways at the south end of the yard. The *Euripides* has been built for Messrs. Geo. Thompson and Co.'s Australian trade, and is a notable vessel in view of the fact that she is considerably larger than any other steamer sailing under the Aberdeen Line flag. The *Demosthenes* and *Themistocles*, both built by Messrs. Harland and Wolff, and the biggest vessels at present on service, are 500 ft. long, with a gross tonnage of about 11,200, whereas the latest addition to the fleet is 570 ft. long, and 15,000 gross tonnage. The *Demosthenes* is a triple-screw steamer, driven by "combination" machinery, whilst her sister is propelled by twin screws. The comparative merits of the two systems of propulsion having been tested, it was decided to have the "combination" in the case of *Euripides*. At time of writing Messrs. Harland & Wolff are actively engaged with preparations for the launch of the *Britannic*, and, all being well, this leviathan will be in the water before these notes are in print, the 26th February being the date fixed for the launch of the year. The two other big boats adjoining the *Britannic* – the Red Star and Holland-America liners—are also well advanced towards the launching stage. The scarcity of men—particularly riveters—has entailed serious delays in shipbuilding in Belfast, and more than one vessel shows little or no difference to the outward eye during the past month or two.

Messrs. Workman, Clark & Co.—On 16th February this firm launched another new addition to the fleet of the Star Line. The vessel is a twin-screw steamer named *Star of England*. She is 516 feet long, and is a sister-ship of the *Star of Victoria*, which left Messrs. Workman, Clark & Co.'s hands in January. The new vessel will be propelled by two sets of triple-expansion engines supplied with steam by three boilers working under forced draught. Like their neighbours, Messrs. Workman, Clark & Co. have suffered seriously through want of riveters; but the drop in freights, which is likely to continue for some time, will shortly begin to be felt in other shipbuilding centres, and unfortunately before long the supply of men may exceed the demand.

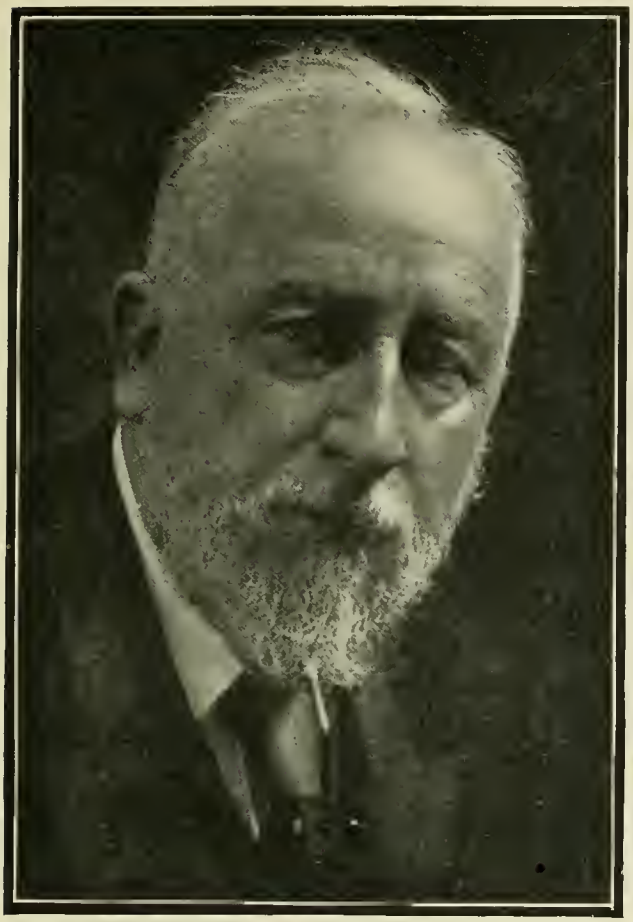
The Harbour.—Reference has been made in recent issues to the various improvements being carried out by the Harbour Commissioners—improvements and extensions rendered necessary by the increasing strides in local shipbuilding—and in addition to the works already mentioned, they are at present rebuilding and strengthening the quay at the south-west corner of Abercorn Basin. Before the large steamers building in the outer berths of Messrs. Harland & Wolff's south yard can be launched it will be necessary to dredge the river in the vicinity, and these dredging operations could not be carried out without danger of the existing quay subsiding, it being constructed many years before it was anticipated that vessels of such large dimensions would ever be built on the Lagan.

Londonderry.—After two abortive attempts to launch their big steamer *San Francisco*, the North of Ireland Shipbuilding Co. were successful in putting the new steamer into the water on the 14th of February. Considerable trouble with the ways had been experienced in the former efforts, but the builders, having decided to grapple with the difficulty in no uncertain manner, decided to take out and entirely rebuild the ways, with the result that the vessel was successfully launched on the above-mentioned date. The *San Francisco*, which is by far the largest vessel yet built on the Foyle, has been constructed to the order of the Isthmian Shipping Co., of London and New York, and is to the design of Messrs. Wm. Esplen & Son, Liverpool. This is the third steamer built by the new company which revived shipbuilding in Derry. They are well supplied with orders, including a vessel about 250 feet long for the Keystone Transportation Co., of Canada, Ltd., Montreal.

OBITUARY.

Sir David Gill, K.C.B.

THE death of Sir David Gill, which was briefly intimated in our last issue as having occurred on January 24th, has removed another of the distinguished Past Presidents of the Institute of Marine Engineers. Eminent in his own special sphere, Sir David Gill attained to the high position he held in the world of science by dint of close application and hard work, but behind this was a devotion to that plane in which he excelled. An Aberdonian by birth and descent, he was born in 1843 and had attained to the three score years and ten. His early education was received at Aberdeen and at Dollar Academy. With regard to the latter institution, he held a high opinion of the methods of Dr. Lindsay, then teacher of Mathematics and Physics, whose system imparted life and interest to his studies and gave an impetus to the intellect of the student—a vital point in connection with education. Continuing his studies at the University of Aberdeen, he devoted his attention more closely to the scientific course and ultimately followed his bent towards astronomical research. With a view to an organized study of the solar system, he supplemented his resources by the aid of photography in his own laboratory and workshop, gathering information as a student which afterwards stood him in good stead. Attracted by his evident enthusiasm Lord Lindsay (Earl Crawford) appointed David Gill to the charge of his observatory at Dunecht. Subsequently he organized the expedition to Mauritius to observe the transit of Venus (1874), included in which was much valuable work in connection with longitude determination, embracing Aden, Alexandria, Berlin, Malta, Mauritius, Rodriguez and Suez.



The Late Sir David Gill, K.C.B.

He was decorated by the Khedive for the services he rendered to Egypt, and as a mark of his attainments he received the gold medal of the Astronomical Society and the Valz Prize of the Institut de France for the expedition in connection with observations of Mars (1877). He was Astronomer Royal at the Cape for over twenty-five years, during which period he carried out much valuable survey and observation work in South Africa. The great value of his contributions to the world of science was further recognised by the conferring of the Legion of Honour by France and by the presentation of medals and decorations by other nations. He was President of the British Association in 1909 and President of the Royal Astronomical Society in 1910. Sir David Gill wrote several works on astronomy and his contributions to the knowledge of the stellar world have earned for him a special place in the roll of astronomers.

Lady Gill, who survives Sir David, and to whom our sympathy is accorded in the loss she has sustained, was a daughter of Mr. Black, of Linhead, Aberdeen.

William Crush.

THE death took place at Bournemouth on January 18, of Mr. William Crush, who from the year 1872 was associated with Messrs. Yarrow & Co., Ltd., formerly of Poplar, now of Scotstoun, on the Clyde, and took a very active part in the development of the Yarrow water-tube boiler and the construction of high-speed and shallow draught vessels. Deceased, in the early days of the Yarrow boiler, was one of the strongest advocates of straight tubes; clearly recognising the great advantage which the adoption of straight tubes would have both as regards the manufacture and subsequent maintenance of the boiler. It was largely due to his unflinching support of Mr. Yarrow's views in this respect that the theoretical difficulties, which it was prophesied would arise from the use of straight tubes, were finally proved to be of no importance, and which experience, ever since, has fully confirmed. At the Yarrow yard in Poplar some of the most remarkable productions, in the way of high speed vessels, of the last century were constructed under his personal supervision. One example is the Russian destroyer *Sokol*, which was the first vessel to attain 30 knots, and which was a marvel of strength and lightness. Since the removal of the firm to Scotland, Mr. Crush again excelled himself in the construction of H.M.S. *Lurcher*, and similar vessels. He also brought the launching of these lightly constructed hulls to a fine art, and during the whole of his forty-two years' service with the firm he never had a single mishap at a launch. Mr. Crush was endowed with keen insight into the character of men, both as individuals and as collective bodies. This, combined with the possession of tact in the highest degree, made his opinion on delicate business negotiations, and in connection with labour questions, of extreme value. His lamented death took place after a very brief illness following an operation. He leaves behind him three sons and three daughters.

Mr. Robert Davie.

THERE recently passed away in his 84th year Mr. Robert Davie, shipowner and timber measurer, Port Glasgow, whose demise means the severing of a close link between the present and the time when Port Glasgow and Greenock as shipping centres were vastly more important than they are to-day. Born in Port Glasgow in 1830, Mr. Davie all through his life was connected with timber import and measurement, as well as with the owning and management of ships engaged in the timber trade, especially those of the old Quebec fleet which sailed between the St. Lawrence and Greenock. In his youth he served in the office of Mr. Adam Patterson, timber measurer and collector of Clyde light dues, Greenock, and when about twenty years of age he entered the office of John Mories & Co., measurers, of the same town. Some years thereafter he went into partnership in the timber measuring and import business with Mr. John Carswell; the firm being known as Carswell & Davie. In 1875 he severed partnership and took into business his eldest son, Mr. John Davie. About twelve years ago the office was removed from Greenock to Port Glasgow, and Mr. Davie took an active share in the business until the end of 1912, when he retired. On matters connected with the early history of Greenock and Port Glasgow industries, Mr. Davie had extensive and well-authenticated stores of knowledge, and he was frequently appealed to when questions of fact concerned with early shipping and shipbuilding were in debate. His memory carried him back to a time in Port Glasgow shipping when over 160 vessels were listed as having arrived at Port Glasgow in two days. "Those that could not be accommodated in the harbour anchored in the river from Garvel Point to Finlaystone." Under the pen name of "Luke Backward," Mr. Davie contributed to the columns of the "Greenock Telegraph" a series of most interesting reminiscences of industrial and social life in Port Glasgow during its hey-day of shipping prosperity, and when it took such a distinguished share in the introduction of steam navigation by producing the *Comet* and other pioneer steamboats. He had personal recollections of many of the men of note connected with the shipbuilding industry of Port Glasgow and Greenock—the Woods, the Steels, the Scotts, etc.,—and as a repository of authentic fact and reminiscence as to local trade and industry he was much sought after. He was an active member of Greenock Harbour Trust, and also of Greenock Chamber of Commerce.

The North East Coast staff of Lloyd's Register, held their fifth annual dinner at Newcastle on January 31st. Mr. Noton, the principal surveyor at Sunderland, presided over the proceedings and in giving the toast of "The Committee of Lloyd's Register" said that so long as the Committee was constituted as it was, Lloyd's Register would continue to hold the position of the premier classification society. Mr. Arthur Scholefield, in responding, said that such was the appreciation in America of the work of Lloyd's Register, that he believed he was justified in saying that the Society would be admitted as the registry of that country.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Sir W. G. Armstrong, Whitworth & Co., Walker-on-Tyne.

SAN WILFREDO. Launch, February 11th. Screw petroleum steamer, built to the order of the Eagle Oil Transport Co., Ltd., London. The chief dimensions of the vessel are as follows:—Length overall, 432 ft.; breadth extreme, 54½ ft.; depth moulded, 30 ft. 8½ in. She is capable of carrying a total deadweight of 9,400 tons on a moderate draught. The vessel has been built on the Isherwood system to Lloyd's highest class, under special survey. She is fitted with poop, bridge and forecastle, and is rigged as a two-masted schooner, the masts being telescopic for the Manchester Canal. For dealing with the cargo there is a large installation of pumps throughout the vessel. The deck machinery consists of a steam windlass, three steam winches and steam-steering gear. The vessel will be fitted with a complete installation of electric light. The propelling machinery is of the quadruple-expansion type, manufactured by the Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne, and will be placed at the after end of the vessel. The cylinders are 24 in. by 35 in. by 50½ in. by 73 in. stroke, the steam being supplied from three cylindrical multitubular boilers 15½ ft. and 11 ft. 9 in. long, with a working pressure of 220 lbs.

Blyth Shipbuilding and Dry Docks Co., Ltd., Blyth.

ELSDON. Trial Trip, January 26th. The performance of ship and machinery during trial gave every satisfaction to all concerned. For Launch, see January issue.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

FRISIA. Launch, January 26th. Steel screw steamer, built to the order of Messrs. The Hamburg-Amerika Linie, Hamburg. The vessel is about 425 ft. in length and 52 ft. beam, with three complete steel decks, and will, when completed, have a deadweight of about 9,000 tons. She is constructed on the deep bulb angle frame principle, having clear holds, and is fitted with the latest improvements and appliances, including electric light, to make her in every way a first-class liner. Water ballast is carried in the double bottom deep tank and after peak. To facilitate the handling of cargo the vessel will be fitted with fifteen steam winches and fourteen derricks. The propelling machinery will be supplied by Messrs. Blair & Co., Ltd., Stockton-on-Tees, consisting of triple-expansion engines with cylinders 28 in., 46½ in., 78 in. by 54 in. stroke, three large boilers with 200 lbs. working pressure.

TIRRENO. Trial Trip, February 13th. The vessel was fully loaded and a speed of 10½ knots was obtained. Everything was satisfactory. For Launch, see January issue.

John Readhead & Sons, Ltd., South Shields.

ONWEN. Trial Trip, January 24th. On this date the *Onwen* was taken to sea on her official loaded trial trip, which was very successful and gave every satisfaction to all concerned. On conclusion of the trial trip she proceeded on her voyage to Genoa under the command of Captain Jenkins. For Launch, see January issue.

R. & W. Hawthorn, Leslie & Co., Hebburn-on-Tyne.

PORT ALBANY. Launch. Passenger and cargo steamer constructed to the order of Messrs. William Milburn & Co., and is the 38th vessel built by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., for the same owners. The vessel is 441 ft. long by 54 ft. broad by 32 ft. depth moulded, and has a carrying capacity of 9,000 tons. She is specially adapted for the Australian trade, with a complete shelter 'tween deck, which has been specially designed so that it may be utilised for emigrant accommodation. Three holds and three 'tween decks are insulated for the carriage of chilled and frozen meat, the freezing plant being of the CO^2 type. Spacious accommodation is provided for first-class passengers, officers and engineers in large deckhouses on the shelter deck and on the promenade deck above. The quadruple-expansion engines, having cylinders 27½ in., 39 in., 36 in. and 81½ in., by 54 in. stroke, capable of giving the vessel a speed of 12½ knots at sea, with four main boilers working at a pressure of 220 lbs. superheated steam, are being constructed by the North Eastern Marine Engineering Co., Ltd. The vessel is being built to the highest class at Lloyd's.

Sir James Laing & Sons, Ltd., Sunderland.

LA HABRA. Launch, January 26th. Oil-carrying steamer, built by the above firm to the order of Mr. Wilh. Wilhelmsen, of Tonsberg, Norway, through Messrs. H. E. Moss & Co., of Liverpool, Newcastle and London, and is a sister ship to the *San Joaquin*, launched in November, 1913, for the same owner. The *La Habra* is intended for the oil trade in the Pacific, and her principal dimensions are as follows:—Length, 425 ft. b.p., breadth, 57 ft. depth moulded, 33 ft. and her carrying capacity over 10,000 tons. The vessel is constructed on the Isherwood longitudinal system, and to the highest class at Lloyd's with special survey, and complies with Suez Canal regulations and Factory Act requirements, also the requirements of the Board of Trade. The vessel has a long poop covering the machinery space and bunkers, bridge deck amidships, and topgallant forecastle. Oil is carried in nine double tanks, which are separated from bunkers and cargo hold by oil-tight cofferdams. Provision is made for water ballast in double bottom under engines and boilers, after peak, as well as in the deep tank forward, which is also adapted for oil fuel. The bunker capacity is specially large, and arranged for either coal or oil fuel. There are three powerful steam winches for warping and the usual direct steam windlass, hand and steering gear, engine-room and docking telegraphs. A refrigerating chamber with ice-making plant for ship's stores is also provided. The propelling machinery, which will be supplied by Messrs. George Clark, Ltd., consists of a set of triple-expansion surface-condensing engines having cylinders 27 in., 45 in., 74 in., with a stroke of 54 in., steam being supplied from four multitubular boilers 13 ft. 9 in. by 11 ft. 9 in., working under forced draught. The oil-burning apparatus will be the Wallsend Slipways Co.'s to their latest practice.

Palmer's Shipbuilding and Iron Co., Ltd., Hebburn-on-Tyne.

SAN ZEFERINO. Launch February 12th. This vessel is one of four large oil tank steamers built by the Palmer Company for the Eagle Oil Transport Co., Ltd., two of them having already been delivered, while another is approaching the launching stage on the stocks at Jarrow. The steamer, which is 420 ft. long, will carry about 9,300 tons deadweight and has been built on the Isherwood system of framing, to class A1 Lloyd's special survey for the carriage of oil in bulk, and is in accordance with the Suez Canal requirements. The vessel has ten pairs of oil compartments with an expansion trunk running the whole length between main and upper decks, with summer tanks arranged for coal or oil fuel at sides, and a deep tank for water ballast or oil fuel under the forward cargo hold. A very complete oil pumping installation is fitted throughout, and steam heating oils are arranged in the oil compartments and cross bunkers. She has a straight stem and elliptical stern, and is rigged as a two-masted fore and aft schooner. A long poop covers the engine and boiler space and the poop, bridge and forecastle are connected by means of a fore and aft gangway. The vessel will be fitted by the Palmer Company with quadruple-expansion engines, for which steam will be supplied by three large single-ended boilers arranged for burning oil fuel and working under forced draught at a pressure of 220 lbs. per square inch. A Marconi wireless installation is fitted.

Pickersgill & Sons, Ltd., Southwick.

POLYKTOR. Trial Trip, February 10th. The trial trip of this vessel passed off most satisfactorily, a mean speed of over 11 knots being obtained on the measured mile. For Launch, see February issue.

Swan, Hunter & Wigham Richardson, Ltd., Newcastle-on-Tyne.

EL ZORRO. Launch, January 26th, from Neptune Works. This steamer, built for the Lobitos Oilfields, Ltd., is of the latest type for carrying oil in bulk, and is fitted with all the most modern improvements for her service. She is 420 ft. in length by 54½ ft. beam, and will carry over 9,000 tons of oil in twenty oil holds, arranged two abreast, with two cofferdams and two pump rooms. There is in addition a cargo hold forward, together with a deep tank for water ballast, and water ballast will also be carried in the fore and after peaks. She is being built to attain the highest class in Lloyd's Register. The propelling machinery consists of a set of triple-expansion engines supplied with steam from three large boilers arranged either to burn coal or to use oil

fuel on the Wallsend-Howden system. The machinery is fitted aft, and both engines and boilers, as well as hull, are being built at the Neptune Works of Messrs. Swan, Hunter and Wigham Richardson, Ltd. The deck and auxiliary machinery is very complete, including steam windlass, steam-steering gear, steam winches, electric light, fans, etc. There is also a complete system of heating pipes throughout the oil holds. Messrs. Wailes, Dove & Co's. patent "Bitumastic" solution has been applied throughout the water ballast tanks and bunkers, and their patent "Bitumastic" covering to the tank top.

IMBER. Launch, February 10th. Steamer, built to the order of the Cork Steamship Co., Ltd., of Cork, and intended for the service of that Company between Manchester and Liverpool and Dutch and Belgian ports. This steamer is the twenty-sixth vessel built at the Neptune Works for the Cork Steamship Co., and another vessel is in hand. The *Imber*, as the new vessel is called, is a finely modelled steel screw steamer, 300 ft. in length by 40 ft. beam, and will carry over 3,200 tons deadweight on a light draught of water. She is being built to attain the highest class in Lloyd's Register, and will have accommodation for a limited number of passengers. She is to be propelled by a set of triple-expansion engines, which, together with the boilers, are being constructed by the builders. They are expected to propel her at a speed of 11½ knots per hour.

MONGARA. Launch, February 11th. Twin-screw passenger steamship, one of several vessels which Messrs. Swan, Hunter & Wigham Richardson, Ltd., have under construction for the British India Steam Navigation Co., Ltd., London. The *Mongara*, which is intended for the Eastern trade, is 464 ft. in length overall, 58 ft. in breadth, with a moulded depth of 35½ ft. There will be accommodation on the upper deck for sixty-six first-class and sixty-four second-class passengers. All the cabins and public rooms will be exceptionally comfortable and commodious. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers and tanks, and their patent "Bitumastic" covering to the tank tops. The twin-screw engines of the triple-expansion type, and also the boilers, are being constructed by the Wallsend Slipway and Engineering Co., Ltd.

SAN LORENZO. Trial Trip. This ship has recently been completed, and had her trial trip at sea off the mouth of the river Tyne several weeks before contract date. During the trial trip at sea everything worked smoothly and to the entire satisfaction of all concerned. For Launch, see February issue.

Doxford & Sons, Ltd., Sunderland.

SAN JERONIMO. Trial Trip, February 10th. This oil-tanker has been built to the order of the Eagle Oil Transport Co., Ltd., for the Mexican oil trade. She carries 15,600 tons, and has a length of 540 ft., a breadth of 66½ ft., and a depth of 34 ft., her draught being 26 ft. She is fitted with four boilers, working at a pressure of 220 lbs. These are oil-fired on a patent pressure system. Her quadruple-expansion engines are designed to give a speed of at least 11¼ knots on a minimum fuel consumption. The vessel has been built to Lloyd's highest class on the Isherwood system of longitudinal framing. The oil cargoes are carried in twelve holds, which are divided longitudinally by an oil-tight bulkhead and separated from the remainder of the vessel by cofferdams. The oil-pumping installation has a capacity of 1,200 tons per hour. The trial lasted nearly six hours, and during the course of it the ship made 11·5 knots. The *San Jeronimo* while at sea pumped in water ballast at the rate of 3,000 tons per hour, and on the whole of the run behaved in a splendid manner. The wireless installation on the bridge deck was utilized on the trial trip to communicate with various ships at a long distance and also with the Cullercoats station. Launched Dec. 13th.

WELBECK HALL. Launch, February 10th. This vessel is under construction to the order of Messrs. Edward Nicholl and Co., Cardiff, and her dimensions are:—Length, 402 ft.; breadth, 52 ft.; moulded depth, 26¾ ft.; deadweight capacity, 8,150 tons. Classification is with British Corporation. Messrs. Doxford are also supplying the engines and boilers.

Osbourne, Graham & Co., Hilton, Sunderland.

WINGATE. Trial Trip, January 28th. During this trial trip, which was in every way satisfactory, an average speed of well over 10 knots was easily attained. For Launch, see January issue.

STEAMER. Launch, February 10th. A steel screw steamer for French owners. She is 220 ft. long, 32 ft. 6 in. broad, 17 ft. 6 in. depth moulded, and is constructed to Lloyd's highest class and to comply with latest requirements of French law. Machinery will be supplied by G. T. Grey, Esq., South Shields, capable of driving the vessel loaded a speed of 10 knots per hour.

Sunderland Shipbuilding Co., Sunderland.

VEENDYK. Launch, February 12th. This vessel, built to the order of the Holland-American Line, of Rotterdam, is quite a superior class of cargo boat, and has been specially fitted up to meet the requirements of the owners' general trade. Her leading dimensions are:—Length, 445 ft.; breadth, 54 ft. 6 in., and depth moulded, 37 ft. 6 in. She is of the three-deck type and will take Lloyd's highest class under special survey. Exceptional loading and discharging facilities are provided, in order that cargoes may be handled with the greatest despatch. There are ten steam winches of special type, those on the bridge and poop being arranged to work the double derricks; the poop winch is also fitted with gipsy gear for lifting the steam anchor, which is housed in hawse pipes under quarter. In addition to the four derricks to each mast, a 50-ton interchangeable derrick is fitted. The cabin accommodation is of a high-class description, being both roomy and handsomely furnished, and is lighted by electricity and steam-heated throughout. Shifting boards are fitted throughout to comply with the Grain Act. Ample water ballast is provided in cellular double bottom and peak tanks. A large refrigerating room is arranged amidships. The main engines are supplied by Messrs. Blair & Co., of Stockton, and have cylinders 28 in., 46 in. and 78 in. by 51 in. stroke, steam being supplied by four large boilers working at a pressure of 180 lbs. per square inch, and fitted with Howden's forced draught arrangements. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels were applied throughout the bunkers, engine and boiler-room tanks, etc., and their patent "Bitumastic" covering to the tank tops.

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Thornaby.

HEADLEY. Trial Trip, January 27th. During the whole of the trip everything worked with the greatest smoothness, and over a series of runs the vessel maintained an average speed of close upon 13 knots. Immediately after the trial trip the vessel proceeded on her voyage to Savannah under command of Captain Dash. For Launch, see January issue.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

EGYPTIAN TRANSPORT. Trial Trip, January 29th. On this date the steel screw steamer *Egyptian Transport* proceeded on her official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12 knots being attained, and the vessel afterwards proceeded on her voyage. The anti-corrosive solution "Siderosthen," manufactured by Messrs. D. Anderson & Son, Ltd., has been applied to the holds of the vessel. This is the sixth new vessel built for Messrs. Houlder Bros. at Messrs. Irvine's yard, on which "Siderosthen" has been used for coating the holds. For Launch, see February issue.

MOBILE. Launch, February 12th. Steel screw steamer, built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool. The dimensions of the vessel are 289 ft. 6 in. by 40 ft. 2 in. by 20 ft. 6½ in. She has a single deck, with poop, bridge and topgallant forecastle, and is built to the British Corporation Registry's highest class. A double bottom is fitted throughout on the cellular principle, the after peak is arranged as a trimming tank and the vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes. Four transverse bulkheads are fitted, dividing the vessel into five water-tight compartments; there are four large cargo

hatches and the vessel is replete with all the latest improvements for loading and discharging expeditiously. A powerful quick-warping steam windlass is fitted forward for working the cables, and combined steam and hand-steering gear is fitted in a house aft, with telemotor attachment to the bridge; a large multitubular donkey boiler is also fitted. Triple-expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 20½ in., 33 in. and 54 in. by 36 in. stroke, with two large single-ended boilers working at a pressure of 180 lbs. per square inch.

CASTLE EDEN. February 16th. Official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked very satisfactorily, a speed of 11 knots being attained. This vessel has been supplied with a Cochran Annan Donkey Boiler, fitted with Patent Seamless Furnace. For Launch, see February issue.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

NORTHERN COAST. Trial Trip, February 6th. On the trial runs of this vessel a mean speed of 12 knots was attained. For Launch, see January issue.

Ropner & Sons, Ltd., Stockton-on-Tees.

LORD TREDEGAR. Trial Trip, February 11th. This vessel made her official trial trip in the Tees Bay on this date. After some very satisfactory trial runs, during which a speed of about 12½ knots was attained, on the measured mile, she proceeded to the Bristol Channel. For Launch, see February issue.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

TWO TRAWLERS. Launches, January 29th. Two steel screw trawlers, the principal dimensions being 136 ft. 8 in. by 23 ft. 3 in. by 13 ft. moulded, built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull. They will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

PENTLAND AND DUNNET. Launches, February 14th. Two steel screw fleeters, the principal dimensions being 112 ft. by 22 ft. 6 in. by 13 ft. 2 in. moulded, built to the order of Messrs. The Hull Steam Fishing and Ice Co., Ltd., Hull. They will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., Hull.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

PANGBOURNE. Trial Trip, January 29th. This vessel, built for the Morocco trade of the Power Steamship Co., Ltd., had a very satisfactory trial trip, and attained a speed, on the measured mile, of 12 knots. The dimensions are:—Length, 250 ft. b.p.; breadth, 40 ft.; depth moulded, 21 ft. 10 in. She has been constructed of steel to the requirements of Lloyd's for their highest classification. Water ballast is provided in the cellular double bottom throughout and in the fore and aft-peak tanks. The vessel has been built specially for general cargo trade, with clear holds well ventilated for carrying perishable cargoes; she has four large hatchways and double steel derricks to each, also a specially fitted derrick for 20-ton lifts. The vessel is equipped with up-to-date machinery for the expeditious handling of cargo, including five steam winches, also Brown's telemotor steering gear, steam warping capstan, direct-acting steam windlass and docking telegraph. The machinery is of the triple-expansion type, with cylinders 18 in., 29 in. and 50 in. dia. by 33 in. stroke, steam being supplied by two large boilers with a working pressure of 180 lbs. per square inch. Both the engines and boilers have been built to Lloyd's classification, while the boilers are also to the requirements of German law.

SOUTH OF ENGLAND.

Phillip & Son, Ltd., Dartmouth.

ARAPAIMA. Launch. Twin-screw passenger steamer, built to the order of the Crown Agents for the Colonies, was recently launched at Dartmouth. The vessel and her machinery have been designed by, and are being built under, the supervision of Messrs. Flannery & Given, Ltd., of Liverpool, London and Rotterdam. She is the first of six similar vessels which Messrs. Phillip & Son are building for passenger ferry service in British Guiana, the principal dimensions being:—Length, 199 ft. b.p.; beam moulded, 25 ft., and depth moulded, 9 ft. The hull of the vessel is sub-divided by four steel water-tight bulkheads, the compartments consisting of fore and aft peak tanks, fore and main holds, and engines and boiler space. The whole of the accommodation for passengers, officers and crew is arranged above the main deck so as to admit of good ventilation for the tropical climate in which the vessel is to work. A steel mast is fitted forward for carrying a derrick to work the fore cargo hold. A steam winch is also fitted for quick handling of cargo and baggage. A large space is specially provided on the fore part of main deck for the carriage of motor cars, waggons and cattle, very large doors being provided in the bulwarks for easy embarking and disembarking. Two sets of compound surface condensing engines are arranged in a roomy engine-room amidships, being supplied with steam at 140 lbs. pressure by a large single-ended horizontal return tube marine type boiler. Especially large independent air and circulating pumps are provided, also independent feed and general service donkey pumps. Steam windlass is to be fitted on top gallant forecastle, steam steering is also to be fitted and the vessel is to be lighted throughout by electricity.

Edward Hayes, Stony Stratford.

STEAM LAUNCH. Trial Trip. Steel-plated steam launch built for the river Tees Port Sanitary Authority. This vessel has recently been sent on her trial trip, and on the measured mile her average speed was slightly over 11 m.p.h. at 240 r.p.m. She is 51 ft. long by 11 ft. wide, 6 ft. 2 in. moulded depth and draws about 4 ft. 4 in., and will be used for conveying patients to the floating hospital on the Tees; cabins are fitted fore and aft. Her machinery is a "Hayes" set of standard C.S.C. engines having cylinders 8 in. and 16 in. by 10 in. stroke, and a marine return tube boiler working under natural draught at 120 lbs. per square inch pressure. An auxiliary feed pump is also fitted.

SCOTCH.

Bow, McLachlan & Co., Ltd., Paisley.

LIGHTSHIP No. 19. Launch, February 12th. Single-screw steam lightship No. 19, built for the Canadian Government. The vessel is of exceptionally strong construction to fit her for the work she is to be engaged in, and besides the lantern and lantern tower, which are special features of the steamer, she is fitted with wireless telegraphy and a complete electric light installation. The engines and boilers are to be supplied by the builders, and these, with the hull, were built under Lloyd's survey as well as Government inspection.

George Brown & Co., Ltd., Greenock.

ARDGOUR. Launch, February 12th. Steamer built for the cargo-carrying trade of Messrs. Lang & Fulton, Greenock. The new vessel is of the following dimensions:—Length, 200 ft.; breadth, 29 ft.; depth moulded, 15 ft. The machinery will be supplied by Messrs. Ross & Duncan, Glasgow.

Caledon Shipbuilding & Engineering Co., Ltd., Dundee.

SEBASTIAN. Trial Trip, February 11th. This vessel which was launched from the yard of the Caledon Shipbuilding Co., of Dundee, on the 24th April, 1913, was taken for a successful trial at sea on the 11th February, when she fully maintained her contract speed. For Launch, see June, 1913, issue. The official trials will be published later.

BARIMA. Launch, February 12th. Twin-screw coastal steamer built for the Royal Mail Steam Packet Co. The *Barima* will shortly be followed by the *Belize*, a sister ship, also under construction at Dundee. The principal dimensions of the Barima are:—Length 230 ft., breadth 37 ft. and depth moulded to shelter deck, 20 ft. 6 in., with a gross tonnage of about 1,500. The vessel has been constructed to the highest class of Lloyd's Registry, and under their special survey. Passenger accommodation of a superior character has been carefully arranged for first and second class, while provision is also made for a number of deck passengers. The whole of the accommodation is thoroughly well lighted and ventilated. The machinery, which has also been constructed at Dundee, consists of two sets of four-cylinder triple-expansion balanced engines, having cylinders

12 in., 20 in., 24 in. and 24 in. in diameter, and 24 in. stroke, with an indicated horse-power of 1,200, steam being supplied by two returned tube cylindrical boilers, having forced draught, and fitted to burn either coal or oil. The *Barima* and *Belize* are considerably larger than the *Kennet*, the vessel at present employed on the Trinidad-Tobago mail service.

Charles Connell & Co., Ltd., Scotstoun.

KNIGHT BACHELOR. Launch, February 12th. Steel screw steamer built to the order of the Knight Steamships Co., of which Messrs. Greenshields, Cowie & Co., Liverpool, are managers. The vessel, which has been built to Lloyd's highest class, has a gross tonnage of about 7,250 tons and a deadweight carrying capacity of about 11,800 tons. She is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines are being supplied by Messrs. David Rowan & Co., Glasgow.

Wm. Denny & Bros., Dumbarton.

EMPEROR ALEXANDER III. Trial Trip. During January this vessel ran successful trials and afterwards left for Odessa. On the official nine hours' trial the speed obtained was 15·2 knots mean; this being slightly better than that obtained by her sister ship, the *Empress Ekaterina II.* For Launch, see November, 1913, issue.

A. & J. Inglis, Pointhouse.

CABO CORRIENTES. Trial Trip, January 20th. This vessel had a successful trial trip and afterwards sailed for Buenos Ayres. For Launch, see November, 1913, issue.

Wm. Hamilton & Co., Ltd., Port Glasgow.

SAINT QUENTIN. Launch, January 24th. Steel screw steamer, built to the order of Messrs. Rankin, Gilmour and Co., Ltd., Liverpool. The principal dimensions are:—Length, 419 ft.; breadth, 52 ft.; depth, 38 ft. to shelter deck; deadweight, 8,250 tons. The vessel is fitted with all the latest arrangements for the rapid handling of specially heavy cargoes, including a large number of steel derricks and nine steam winches. The vessel will be fitted with machinery by Messrs. David Rowan & Co., of Glasgow, consisting of triple-expansion engines having cylinders 27 in., 44 in. and 73 in. by 48-in. stroke; three single-ended marine boilers 15 ft. 6 in. diameter by 11 ft. 6 in. long, having a working pressure of 180 lbs. The vessel is classed with Lloyd's Registry for their highest class, longitudinal framing (Isherwood system).

Harland & Wolff, Ltd., Govan.

H.M.S. LYNX. Trial Trip, January 22nd. This torpedo boat destroyer, one of the three built for the British Navy, by the London and Glasgow Engineering and Shipbuilding Co., Ltd. (now Messrs. Harland & Wolff, Ltd.), ran her final acceptance trials very successfully and subsequently left for Portsmouth to be commissioned.

MISSISSIPPI. Launch, February 11th. The launch of this vessel from Messrs. Harland & Wolff's yard at Glasgow is specially interesting as the first ship built by them with internal combustion (Diesel) engines. As evidence of the importance attaching to the event, the chairman of Messrs. Harland and Wolff, Ltd., Lord Pirrie, crossed specially from Belfast and was joined at the yard by the chairman of the White Star Line, Mr. Harold A. Sanderson, and Mr. Charles F. Torrey, the managing director of the Atlantic Transport Line. These gentlemen spent all the morning in the works of the engine builders—the Burmeister & Wain (Diesel system) Oil Engine Co., Ltd. (of which Lord Pirrie is chairman)—inspecting the machinery for the *Mississippi*, as also that for a number of other vessels which Messrs. Harland & Wolff are building. It is well known that the Atlantic Transport Line is one of the subsidiary companies of the International Mercantile Marine Co., of which Mr. Harold A. Sanderson is president, and with which the White Star American, the Dominion and other lines are also closely associated. The same builders have under construction motor vessels for the Leyland Line, which is also connected with the International Mercantile Marine Co., for the Pacific Steam Navigation Co., and Elder Dempster & Co., Ltd., which companies are closely connected with the Royal Mail Co. and Lamport & Holt, Ltd The *Mississippi* will be fitted with two 4-stroke cycle single-acting Diesel engines, each coupled direct to its line of shafting; also two 4-stroke cycle single-acting auxiliary Diesel engines, each coupled direct to its dynamo and air compressor. Each of the main engines has six cylinders 26⅜ in(670 mm.) in diameter and 39⅜ in. (1000 mm.) stroke, with 105 revolutions per minute, the normal horse-power will be 1,600 i.h.p. for each engine. The new vessel is 383 ft. 9 in. long overall and 50 ft. 4 in. extreme beam, having a gross tonnage of about 5,000, and is built on the usual approved plan as regards water-tight bulkhead construction and double bottom. The vessel has five steel decks and the latest arrangements for working ship and cargo, including electric winches and windlass, also electrically operated and controlled steering gear, and a complete installation of electric light. She is efficiently ventilated throughout, and in addition to wireless telegraphy apparatus has a submarine signalling installation. The rooms are heated by a complete system of electric heaters, and the cooking is also done electrically.

Hawthorns & Co., Leith.

ILA. Launch. Twin-screw motor coasting vessel, launched end of January, the first of two sister boats, which they are building for Messrs. Elder, Dempster & Co., Liverpool, for coasting purposes on the West Coast of Africa. Length overall 140 ft. 6 in. Each vessel will be fitted with two sets of Bolinder reversible crude oil motors of 120 b.h.p. each.

D. & W. Henderson & Co., Ltd., Partick.

NOVIAN. Trial Trip, January 19th. During the trials on the Firth of Clyde the machinery worked well and everything proved satisfactory to owners' representatives and builders. For Launch, see January issue.

KALIMBA. Launch, February 12th. Steel screw cargo steamer, constructed to the order of Messrs. Maclay and M'Intyre, of Glasgow. The vessel is 416 ft. in length overall, 52 ft. in breadth moulded, 29 ft. 10 in. in depth moulded, and of about 4,950 tons gross, and will be classed under Lloyd's 100 A1 three-deck rule. She has been fitted with all the latest improvements to ensure the rapid and safe working of the large cargo which she has been designed to carry, including nine powerful winches and also large derricks fitted at the hatches. There is a complete installation of electric light throughout the vessel, and steam steering gear is fitted amidships. Triple-expansion engines will be supplied and fitted by the builders, having cylinders 25 in. 41 in. and 67 in. diameter and a 51 in. stroke, supplied with steam by three large single-ended boilers, working at a pressure of 175 lbs.

Archibald McMillan & Son, Ltd., Dumbarton.

RIOUW. Launch, January 27th. Steel screw steamer, built to the order of The Stoomvaart Maatschappij "Nederland." The dimensions of the vessel, which is of the shelter deck type, are:—Length overall, 470 ft.; breadth, 56 ft., and depth moulded to shelter deck, 38 ft. 3 in. When completed, she will trade in the Far East, and is specially arranged for the transport of pilgrims. The arrangements for handling cargo are very complete and up-to-date, and include twenty steam winches and twenty-seven steel tubular derricks, one of these being suitable for loads up to 30 tons. Large water ballast capacity is arranged for in cellular double bottoms, both peaks and deep tank amidships. A few first-class passengers will be carried. The steering gear is of the Wilson-Pirrie type with telemotor control, and a fire extinguishing and disinfecting apparatus of the Halley type is installed. Electric light is fitted throughout all accommodation and cargo spaces, the power for which is generated by two steam turbine driven dynamos. Steam heating is fitted in all accommodation. Wireless telegraphy will also be installed, and altogether the vessel is fitted out in a very complete and superior manner. The propelling machinery is being supplied by Messrs. David Rowan & Co., Glasgow, and is designed for a speed of 13½ knots. The engines have cylinders 28½ in. 47 in. and 82 in. with a stroke of 54 in., and the boilers are six in number, each 13 ft. 9 in. diameter by 12 ft. long, working at a pressure of 214 lbs. per square inch, and fitted with Howden's system of forced draught. Both vessel and machinery have been built to Lloyd's highest class.

Ramage & Ferguson, Leith.

TRANSVAAL. Launch, February 11th. Steamer built to the order of the East Asiatic Co., of Copenhagen, for their trade from the Baltic to South Africa and Australia. The

largest steamer built at Leith. Dimensions—Length overall 375 ft., breadth 51 ft., depth moulded to awning deck 31 ft. Gross tonnage 4,383 tons, total deadweight carrying capacity about 7,200 tons.

Russell & Co., Port Glasgow.

SANT EGBERT. Launch, February 7th. Screw steamer of 5,600 tons gross, built to the order of Messrs. Rankin and Gilmour, Liverpool.

Scott & Sons, Bowling.

CARRAWDORE. Launch. Screw steamer, for Messrs. John Kelly, Ltd., Belfast. The vessel, which is 180 ft. in length, 29 ft. in breadth, 13 ft. in depth, and of 600 tons gross, will be fitted with triple-expansion engines by Messrs. Aitchison & Blair, Clydebank.

IRISH.

Dublin Dockyard Co., Ltd., Dublin.

STREATHAM. Launch, January 29th. Screw steamer, built for Messrs. John Harrison, Ltd., London. The vessel is 226 ft. in length between perpendiculars, 33 ft. 3 in. in moulded breadth, 16 ft. 7½ in. in moulded depth, and of 1,700 tons deadweight carrying capacity. The machinery, which is of the high-pressure triple-expansion type, is being supplied from Glasgow.

Harland & Wolff, Ltd., Belfast.

EURIPIDES. Launch, January 29th. Triple-screw steamer under construction for Messrs. Geo. Thompson and Co., Ltd.'s passenger and cargo service between London and Australia. The *Euripides* is a very handsome vessel of similar type to the *Themistocles* and *Demosthenes* already running in the same service, but the new vessel is considerably larger, being 569 ft. overall in length, 67 ft. 3 in. beam, with a gross tonnage of about 15,000 and a displacement of 25,000 tons. She has been constructed under Lloyd's survey for the 100 A1 class, also in accordance with the requirements of the Admiralty Transport Department and the Board of Trade passenger survey. The cellular double bottom extends the whole length of the ship, and she is sub-divided into twelve water-tight compartments, so arranged in conjunction with the general design that the vessel would still remain afloat with any two of the compartments simultaneously flooded. The vessel will be a very large cargo carrier and is fitted with every modern device for the safe and speedy handling of all kinds of goods.

Her seven hatches will be served by no less than nineteen winches, and powerful electric lights are provided so that working by night can be carried on as efficiently as by day. The vessel will be insulated for the carriage of frozen cargo of all kinds upon the most approved principles. To ensure the satisfactory carriage of fruit, fans are provided for circulating air over cooled coils, and three compartments have been specially adapted for the conveyance of chilled beef. The *Euripides* will be pre-eminently a passenger ship, and the arrangements made for the comfort of travellers leave nothing to be desired. As usual, with the Aberdeen Line, two classes only will be carried, *i.e.*, first and third, the whole of the midship accommodation being devoted to the former, and the whole of the after accommodation to the later. The public rooms will be exceptionally large and commodious. The ventilation throughout has been carefully considered; it will be of the most thorough and complete kind, both natural and mechanical systems being employed. Lifeboat accommodation is provided for all on board. The *Euripides* will have wireless telegraphy and submarine signalling apparatus, and will make the passage between London and Melbourne in about forty days.

North of Ireland Shipbuilding Co., Londonderry.

SAN FRANCISCO. Launch, February 14th. Steamer, built for the Isthmian Steamship Co., London and New York. The vessel, which has been built from designs by Messrs. William Esplen & Son, consulting engineers, Liverpool, is 405 ft. in length between perpendiculars, 52 ft. in extreme breadth, of nearly 9000 tons deadweight capacity, and she will have a speed of 12 knots. Triple-expansion machinery will be supplied by Messrs. Richardsons, Westgarth and Co., Hartlepool, and will be installed at Londonderry. The *San Francisco* is the largest vessel yet built at the port.

Workman, Clark & Co., Ltd., Belfast.

STAR OF ENGLAND. Launch, February 16th. Twin screw steamer, built for the Commonwealth and Dominion Line, Ltd., London. This steamer was specially designed to meet the requirements of Messrs. J. P. Corry & Co., London, for their well-known Star Line, but owing to the amalgamation of companies will sail under the flag of the Commonwealth and Dominion Line. The new vessel, a sister ship of the *Star of Victoria*, which left Belfast a month ago, is of the shelter-deck type, 516 ft. in length with a gross tonnage of over 9,000, has been built under special survey for the highest class in Lloyd's, complies with the Board of Trade requirements for a first-class passenger and cargo steamer, and will be a valuable addition to the fleet for the trade between Great Britain and the Australian and New Zealand colonies. The upper 'tween deck spaces are designed and constructed so that they can be readily adapted for the accommodation of about 900 third-class passengers, who will be carried in rooms fitted with berths and wash-basins, while suitable dining spaces, smoking and sitting rooms, also ample lavatory accommodation have been provided. The equipment of the vessel includes an installation of Rich's system of fire detection, by means of which an outbreak of fire in any of the cargo spaces is indicated in the chart-room, and can be immediately dealt with by the officer on watch; also an installation of wireless telegraphy and submarine signalling, while the lifeboat accommodation is in excess of the Board of Trade requirements, the boats being placed under Welin davits, by which they can be rapidly swung out and lowered by one man at each boat. The cargo space is divided into six holds, four of these being insulated for carrying chilled and frozen meat cargoes, while a portion of the after 'tween deck space is fitted for the reception of perishable stores and dairy produce. In conjunction with these insulated spaces an extensive plant of refrigerating machinery has been arranged. The propelling machinery consists of two sets of triple-expansion engines, with the necessary auxiliaries, supplied with steam from three steel boilers working under forced draught.

Oil Fuel Burning Apparatus.—An application for the grant of a patent having been made in 1912 by Mr. L. E. Smith of Messrs. Smith's Dock Company and Mr. R. A. Meyer for improvements on the well-known Meyer patents of 1899 and 1906, and such grant of patent being opposed, the Law Officer, sitting as a Court of Appeal, decided that a patent upon the application of 1912 should be granted and sealed in favour of Messrs. L. E. Smith and R. A. Meyer.

Load Line Committee.—A meeting of the Load Line Committee was held at the Board of Trade on the 5th February, Sir Philip Watts, K.C.B., F.R.S., in the Chair. It is understood that the Committee have nearly completed their arrangements for taking evidence and, therefore, if anyone desires to give evidence before the Committee he should communicate at once with the Secretary to the Committee, Mr. C. J. O. Sanders, 7, Whitehall Gardens, London, S.W.

Quenched Spark Wireless Installations for Ships.—We have received from Messrs. Siemens Brothers & Co., Ltd., a copy of their revised pamphlet A.550, which deals with their quenched spark wireless installation for ships. The manufacture of this apparatus was taken up by Messrs. Siemens Brothers & Co. at their works at Woolwich in 1911, and the progress which it has made in England is shown by the fact that there are now over ninety British vessels fitted. Amongst the well-known Companies which have adopted this system may be mentioned the following shipping Companies:—The Federal Steam Navigation Co., Messrs. Alfred Holt & Co., The Indra Line, Ltd., The General Steam Navigation Co., The Australind Steam Shipping Co., Messrs. P. Henderson & Co., and the Dover Harbour Board. The chief advantages of this system are summarized in the pamphlet, among which may be mentioned—large range, high speed and efficiency of transmission; the installation is practically noiseless, therefore no sound-proof cabin is necessary. The pamphlet is well illustrated throughout, and all those interested in wireless telegraphy should apply for a copy.

LETTERS TO THE EDITOR.

To the Editor, MARINE ENGINEER AND NAVAL ARCHITECT.

Sir,—Having just returned from abroad, I am surprised to hear of the startling changes contemplated, or rather to come into force next year, by the Board of Trade *re* engineers' certificates. Holding a first-class certificate myself, which I value, the idea of extending the sea time required to eighteen months I quite agree with, in view of the fact that the machinery has increased so much and is so much more complicated during the last few years. But there is one point which I do not agree with, and that is the clause "That part of the qualifying sea time can be replaced by attendance at a school." This to me appears to be the first step from which after a time engineers will be able to qualify without going to sea at all. Now, any practical man knows that by far the most important part of a marine engineer's training is his sea experience; as an example of this, take the case of a young man approaching any superintending engineer for a berth, the first question he is asked is, "What sea experience have you?" My idea, if I may be allowed to express it, would be to make the qualification fifteen months on watch. The other three months might be put in, in any other capacity as a junior engineer at sea, counting in the same way as school time is proposed to do, *viz.*, three months instead of two, thereby maintaining the prestige of the engineer's certificate as a practical qualification.

Allow me to thank you for so ably bringing this subject before your readers and the Board of Trade, and I sincerely trust that the matter will not be dropped until these regulations have been rescinded.—Yours truly,

JUNIOR.

London, Feb., 1914.

To the Editor, MARINE ENGINEER AND NAVAL ARCHITECT.

DEAR SIR,—With reference to the alterations in the Board of Trade Regulations for the examination of engineers I beg to support the disapproval of your other correspondents. I fail to see any advantage gained by substituting technical school training for sea service. The practical experience of a marine engineer is his most valuable asset and therefore the profession should strongly protest against any scheme which tends to mix up in any way practical training which a man obtains at sea with any time spent at a Technical School. I quite agree with increasing the sea service to eighteen months and also with some of your writers proposing a third engineer's certificate to be granted before a young man goes to sea. Practical experience must be given the first consideration, as it is most necessary in the interest of marine engineers and public safety.

Yours faithfully,

L. RICKINSON.

London, N., February 17th, 1914.

REVIEW.

Munro's Marine Engineer's Annual. Price 1/-. Published by Messrs. James Munro & Co., Ltd., Glasgow, is an interesting publication for marine engineers. This year Donaldson's Engineers' Annual, which has been issued for a number of years past as an independent annual, has been incorporated with Munro's Annual. In the fourth yearly issue of the combined publication, a number of new features have been introduced in order to make the annual of still greater service to the marine engineer than hitherto. A considerable amount of information is contained in its pages, and it is published at a popular price.

BOARD OF TRADE EXAMINATIONS.

JANUARY 22nd, 1914.—LONDON.—*1st Class:* W. Cooper, H. Drewry, H. Howe, A. Windram. *2nd Class:* J. Fryatt, J. King, J. Whitehead.

WEST HARTLEPOOL.—*1st Class:* J. Mann, C. Peters, R. Phillips, S. Robinson. *2nd Class:* J. Frain, W. Grainger.

NORTH SHIELDS.—*1st Class:* H. Murphy, J. Ogilvie, R. Swinson, R. Waugh. *2nd Class:* T. Bilclough, N. Greenhow, S. Martin.

LEITH.—*1st Class:* C. Martin, T. Robertson. *2nd Class:* G. Miles, B. Ross.

LIVERPOOL.—*1st Class:* R. Crockett, R. Miller, R. Wainwright. *2nd Class:* B. Dayer, S. Fox, S. Price, R. Wolfe.

GLASGOW.—*1st Class:* G. Black, A. McKendrick. *2nd Class:* A. Ballantyne, A. Macdonald.

SOUTHAMPTON.—*1st Class:* R. Potter. *2nd Class:* S. Chiverton, J. Osborne.

CARDIFF.—*1st Class:* A. Lewis. *2nd Class:* G. Ayland, J. Beyon, W. Goodman, A. Gregory, J. Kemble, D. Phillips, D. Rees, H. Thomas, W. Thomas.

JANUARY 29th, 1914.—LONDON.—*2nd Class:* H. Hillier, G. Johnson, R. Keough, J. McFarlane, W. Redman, W. Sorrell, S. Voller.

ABERDEEN.—*1st Class:* A. Downing. *2nd Class:* A. Mackay, W. Scroggie, P. Waddell.

BRISTOL.—*1st Class:* H. Edwards, A. McQuade. *2nd Class:* E. Morgan, J. Perchard.

DOVER.—*1st Class:* H. Chapman, J. Flarin.

GREENOCK.—*1st Class:* J. Cook, J. Hogg, J. Maxwell. *2nd Class:* G. Chalmers, P. Kean, P. Roy.

NORTH SHIELDS.—*Extra 1st Class:* A. Glen. *1st Class:* G. Blenkinsop, R. Coomber, J. Dickie, E. Edwards, N. McCallum, J. Robinson. *2nd Class:* W. Hibbert, T. Lupton, J. Tilley.

SOUTHAMPTON.—*Ex. 1st Class:* H. Payn.

LIVERPOOL.—*Ex. 1st Class:* J. Hayward, J. Mellor, R. Pakenham-Walsh. *1st Class:* S. Gould, J. Harding, C. Matthews, A. Richardson, E. Vick, H. Williams. *2nd Class:* W. Ekbery.

SUNDERLAND.—*1st Class:* F. Charlton, J. Cook, G. Hall, H. Saville, A. Taylor. *2nd Class:* T. Emerson, F. Hogg, H. Job, T. Morrison, R. Saville, T. Scott, J. Walker, T. White.

GLASGOW.—*Ex. 1st Class:* D. Wilson.

HULL.—*Ex. 1st Class:* V. Hadland, J. Marshall. *1st Class:* C. Cole, S. Perry, E. Sylvester, H. Watson. *2nd Class:* E. Butler, J. Cade, A. Dugnid, H. Kay, J. Pitman, S. Scott.

FEBRUARY 5th, 1914.—LONDON.—*1st Class:* F. Knight, C. Mabey, H. Park, A. Whatmore. *2nd Class:* S. Archibald, S. English, W. Mackie, O. Newman.

LEITH.—*2nd Class:* J. Allan, J. Ellis.

BELFAST.—*1st Class:* W. Cumming, R. Gamble. *2nd Class:* J. Crabbe, J. Stewart, E. White.

SOUTHAMPTON.—*1st Class:* G. Clement, A. Cordiner, J. Fairley, G. Martin. *2nd Class:* C. Harnett, W. Hirst, J. Lowthian, H. Paxton.

CARDIFF.—*1st Class:* F. Axtens, F. Bailey, E. Hughes, H. Searle, E. Williams. *2nd Class:* W. Jones, G. Meddins, W. Morris, A. Ridley.

LIVERPOOL.—*1st Class:* A. Dench, W. Duff, E. Edwards. *2nd Class:* J. Davies, J. Fields, R. Figueroa, J. Fleming, T. Honghton, D. McLaren, J. McMakin, T. Mills, M. Regidor, J. Salas.

NORTH SHIELDS.—*1st Class:* C. Booth, G. Byers, J. Chambers, J. Fowler, L. Marshall, F. Mitchell, M. Smith. *2nd Class:* F. Balcombe, G. Cuthbertson, J. Dumble, A. Little, F. Wigzell, G. Wood.

GLASGOW.—*1st Class:* R. Brown, J. Hutcheson, H. Wilson. *2nd Class:* D. Brown, T. Carroll, W. Mehl, D. Smith.

FEBRUARY 12th, 1914.—LONDON.—*1st Class:* D. Mason, A. Mervyn. *2nd Class:* D. Clarke, S. Jones, E. Wilking.

GREENOCK.—*1st Class:* T. Morton, W. Park, J. Stocks. *2nd Class:* A. Dollar, J. Dunbar, G. Luke, W. Milne, J. Rowan, W. Service.

HULL.—*1st Class:* T. Parker. *2nd Class:* W. Blanshard, H. Bradley, J. Crockett, R. Linslay.

LIVERPOOL.—*1st Class:* T. Nuttall, J. Patterson, C. Tunnicliffe. *2nd Class:* E. Griffith, D. Rackett, T. Thomas.

NORTH SHIELDS.—*1st Class:* S. Bolam, M. Bulloch, H. Dawson, J. Mavins. *2nd Class:* W. Duthwaite, J. Elliott, N. Macaulay, H. Martin, J. Muir, T. Rennie, H. Robinson, M. Warren.

BREAKDOWNS AT SEA.*

FROM time to time engine breakdowns occur, some of which entail loss of life, delay and great expense. If the question is considered it would be found that the cause of engine breakdowns could be reduced to four items, *viz.*, bad design, careless workmanship, neglectful supervision, fatigue of material.

During the last few years the marine engine has been brought to a high state of efficiency both thermal and mechanical. Yet there remains plenty of scope for improvement in the minor details of the outfit of a modern cargo vessel. The tendency of the engineering world to-day is to make all machinery as fool-proof as possible, with a view to rendering it as free from breakdowns as possible. If we were to visit the engine-room of some large vessel we should be surprised at the number of valves placed here and there without any indication of their particular duty, or the direction in which they open or close. If the threads on the spindle were exposed to view we might feel quite safe, but with the threads inside the valve chest, who knows whether it is a right-hand or a left-hand thread. Sometimes we come across valves in such a position that it is impossible to overhaul them, since they foul some permanent portion of the vessel, such as a bulkhead and beam or a side stringer. There are steam pipes having expansion bends, without any means of draining them, which is sure to result in water-hammer and burst pipes; boiler mountings with $\frac{3}{8}$ in. gland studs, which either corrode away or the threads strip with very little pressure and the stuffing box not being deep enough, perhaps only holding two turns of packing. A shallow stuffing box of this description would be best run up with lead, since soft packing would never remain tight. Considerable trouble is given from time to time by the wooden handles which are fitted to indicator cocks, sight-feed lubricators, drain cocks, etc., as they crack and fall off, due to the intense heat and oil. It is suggested that fibre handles would be an improvement. These are a few of the minor troubles that would cost practically nothing to remedy, there are several other details of a like nature which, however, would occupy too much time to discuss.

CONDENSER.—One of the great sources of trouble with the modern surface condenser is the burst or leaking tube. The first intimation of this will be an increase in the water level of the boilers. This is very undesirable, since salt water carries with it scale-forming matter which will be deposited on the heating surfaces and thus reduce the thermal efficiency. A very effective method of stopping small leaks is to pass sawdust into the circulating pump through its pet cocks. The sawdust will be drawn into the leak and thus stop it. If, however, the leak or burst is large, we must stop the engines, shut down the feed check valves, bilge valves and main injection valve, then take off the man-hole door at top of condenser and also the examination doors at each end, pass a hose pipe into the condenser through the top door and fill it up with water from the sea. The leaking or burst tube will then be discovered, since water will flow from it. During this process tapered soft wood plugs about 3 in. long should be made, to drive into each end of the affected tube or tubes. The condenser must now be emptied, say, by opening the air-pump suction valve door. All joints to be re-made and the engine started again.

Another source of condenser trouble is loss of vacuum. This may be due to one or more of the following causes:—Defective air pump, defective circulating pump and insufficient water supply, leaking glands at l.p. engine, division plate broken, leakage of air into condenser (bad joints), air locks in water space. A defective air pump is generally caused by one of the head valves becoming broken or worn out. On one occasion while passing through the West Indian Islands the suction and delivery valve division plates collapsed and immediately reduced the vacuum to nil. The ballast pump was at once set to work as a circulating pump to maintain a vacuum, and for two days these conditions prevailed. However, on gaining the open sea where we ran no risk of running ashore, it was decided to attempt a repair to the circulating pump. This was done by making false division plates out of $\frac{1}{4}$ in. sheet brass doubled and held in position by tap bolts. On arriving into port the permanent repair was a similar arrangement, only with cast gun-metal plates. Leaking glands can be detected by holding a light near to the gland, when, if a leak exists, the light will be drawn towards the gland. A broken division plate allows the circulating water to pass straight from the inlet to the outlet without the water having passed through the tubes. The condenser will be quite hot at one end and cold at the division-plate end. We would repair this by fitting a brass, iron or hard wood division plate, and on arrival in port, rather than condemn the whole door, fit a special cast-iron casting similar to the arrangement before the collapse. However, if the door shows signs of being mushy it should be condemned. Air leakage is very often difficult to locate; sometimes it can be heard, and if not the lamp test must be resorted to. Air locks consist of a portion of air that becomes trapped in the upper portions of the water side of the condenser, and thus preventing water from passing through the top rows of tubes. By fitting an air cock and thus allowing the water pressure to force the air out, we obtain better conditions.

Deflectors or guides should also be fitted on the steam side of the condenser, so as to bring the whole of the cooling surface into action. By carefully noting the temperatures in and around a condenser we can draw safe conclusions as to its efficiency. A great deal of trouble is sometimes caused when in shallow rivers, owing to mud and sand being drawn into the condenser and choking it up; however, if an upper injection valve is fitted we should be able to save the situation by drawing water from a level 10 ft. to 15 ft. above the main injection. Not having an upper injection valve, and knowing the nature of the river or harbour under consideration, we should previously have filled any available ballast tanks with water, with a view to pumping this water through the condenser while going up river. Sometimes the main injection valve grid becomes choked, due to seaweed; by stopping the engine for a few seconds this obstruction will be almost certain to release itself. A steam connection to the main injection valve box would have blown the obstruction away. Ice is also another source of annoyance which could be successfully overcome by fitting a steam connection.

To attempt a repair of a broken injection valve spindle without going into dry dock is almost an unheard-of thing, yet it can be successfully carried out in the following manner. Arrange a tarpaulin of double thickness over the grid and have the four corners fastened to ropes, so as to keep it in position. Then disconnect the injection pipe and allow the valve to be eased off its face, so as to ascertain the success or otherwise of the tarpaulin as a means of keeping the water out. In the case that I have in view the water leaked in for about ten minutes, and then practically stopped, thus allowing the work to be completed.

SHAFTING.—The engine shafting should be thoroughly examined at every available opportunity, both for alignment and for surface flaws and cracks. The alignment is tested by either sighting along the couplings, or by removing the coupling bolts and passing testers between the coupling faces, and thus detecting any error in adjustment, which should be at once corrected. A ship hogs or sags according to the disposition and weight of the cargo. We should at all times keep a look out for this, since we may have one or two bearings doing all the work and incidentally running dangerously hot. To remedy this, the bearings not taking any weight, should be wedged up till they take a share of the work. The main shafting should be machined all over, to enable surface flaws and cracks to be detected, and should on no account be covered with paint. Surface flaws should be carefully investigated. It is advisable to drill a small hole at each end of the flaw and thus prevent it from spreading along the shaft. If possible, we should ascertain the depth of the flaw, and having done so, calculate the net area of the shaft, since it may be necessary to reduce the horse-power until a new shaft can be fitted. We can approximate the volume of a flaw by pouring oil or water into it, keeping a record of the amount absorbed.

* An address delivered by Mr. R. W. Thompson, on 31st January, before the Graduate Section, N.E.C.Inst. of Engineers and Shipbuilders, Newcastle-upon-Tyne. Mr. E. Leslie Champness, B.Sc., in the chair.

If a shaft is broken into two pieces, the ends should be brought together and pieces of plate dove-tailed into each portion; this will take the fore and aft thrust. We should then fit clamps, around the circumference, made out of a square bottom end or a patent coupling. The crank shaft in vessels of moderate power is nearly always made hollow. This is very desirable, since the bad material at the core will have been placed at a more advantageous position; again, we have this hole into which we could fit a bolt or rivet to take the fore and aft thrust, in the event of the shaft breaking. The circumference would, however, need to be clamped either by a spare bottom end or some other suitable clamping device. The tail-end shaft is now generally fitted with a continuous brass liner about $\frac{5}{8}$ in. thick, shrunk on to the shaft and held in position by brass or gun-metal set screws which are flush with the liner. Corrosion is one of the principal defects which occur in tail-end shafts and may be looked for at the beginning of the tapered portion of the shaft adjacent to the liner. If the engine runs in a right-hand direction it is advisable to fit a left-hand screw and nut on the propeller shaft, as the tendency will then be for the nut to tighten up on the propeller. Crank shaft webs occasionally burst, owing to the excessive strain set up in the web after the pin has been shrunk in. They are repaired by passing bands around the web or by plate patches.

BURST STEAM PIPES.—A burst steam pipe may be due to a number of causes. Water hammer; local extension of material and then rupture; pipe being too rigid and no allowance for expansion and contraction, the material gradually becoming "fatigued," and thus no longer able to carry the test pressure; defective brazing. The pipe must be isolated from the pressure if the burst or crack is very large. We have the option of fitting a joint over the crack and then clamping this in position by one or more bands passed around the pipe. Or we could put a cement muff over the affected part and wire binding, and this has in the past given satisfaction. If the brazing has given out we may cut the flange off completely from the pipe, and if we have not sufficient pipe to join up again after taking what we can out of the expansion bend, we must fit in a distance piece.

BOLT FISHING.—Fishing for bolts is now almost an unheard-of thing on a modern vessel, yet in the old tramp steamers it was a daily occurrence in port. The riveting being of poor quality would work slack and thus water would come into the vessel, and caulking would only check matters for a short time.

To prevent this leakage bolts with grummet and washers were prepared. A cork with a long length of string was then procured. The faulty rivet was then punched out and the cork passed through the hole thus caused; it immediately floated to the surface carrying with it the string. The man on the look out for the cork would substitute the bolt for the cork, and then give the word to those below to haul the bolt into place; the grummet washer and nut were then put on and screwed up. It might be well to add, however, that those concerned in the above operations would be drenched to the skin. Ballast tank plugs accidently left out when in dry dock may be put into place while the vessel is afloat by a similar arrangement.

PISTON ROD.—A piston rod may become bent, due to overheating, and this may be brought about by several causes. Engine out of line (fore and aft); gland not screwed up parallel; insufficient or no lubrication; too much play between guide shoe and face. The only way to straighten a bent piston rod in place without running grave risks is to let the engine come on to the bottom centre, and then heat the concave side, and at the same time keep the convex side cool by means of a water service. The idea being that the lengthening of the fibres of the concave side will pull the rod back to its normal condition; this may be assisted by the careful use of bottle jacks. Piston rods sometimes wear oval in section, due to the first and fourth causes stated, and also to the rod having soft places running the full length of the rod, but only on one side. Rods are very often scored due to bad packing and subsequent inattention.

PROPELLERS.—Nearly all ships carry a spare propeller and tail-end shaft. The propeller we may find in one of the after holds, or in the 'tween decks, or on deck; this would seem to be the proper place for it since it would be necessary to unload the vessel before we could get at it. The spare tail end shaft we may find in the 'tween decks or in the poop; it should, however, be in the tunnel recess ready for an emergency. The present way of removing the tail-end shaft out of the tunnel is by taking off a portion of tunnel plating, after having discharged the cargo. This entails a considerable loss of time, probably three or four days. It would therefore seem an advantage to have the tunnel recess so constructed that the shaft may be removed through the ship's side This might require a frame to be cut to allow the coupling to pass through; the aperture thus caused to be sealed up by a water-tight cover, removable from the inside.

Formerly, if a piece of one propeller blade was broken off the others were cut off to match the broken one, and thus preserve a balance. Since the introduction of successful electric welding, however, it is usual to weld a new piece of blade on. In one case, owing to the propeller having struck some floating logs, all the blades were broken. In this condition the ship was making about $2\frac{1}{2}$ miles per hour, and the distance to travel was about 2,500 miles. A land-locked bay being within 60 miles it was decided to go there and try and fit the spare propeller. The nearest dry dock was about 600 to 700 miles away. Having found a suitable anchorage the vessel was tipped until the propeller boss came out of the water. The propeller nut was then eased back about two threads, and the shaft in the tunnel shored up so as to take the strain when the wedges were driven in between the propeller boss and the stern post. A stage was rigged under the stern from which to conduct operations. After several blows on the wedges the propeller was started back. During these operations preparation had been made to take the weight of the propeller when the shaft was ready to be drawn in. The strongest blocks available were used, and through these were reeved the wire mooring ropes, the loose end of which was taken to a winch. Two sets of blocks were used, each having its own winch. Special wire slings were hung over the counter, one port and one starboard, and from these the blocks were hung. The slings to lift the propeller were then shackled to the lifting blocks. The winches then hauled in the available slack, and the shaft was drawn in. The propeller was then hauled up clear of the water, and a raft floated into the aperture, the propeller was then lowered, down on to the raft and towed around to the ship's side and made fast. The masts having a large amount of rake, it was decided to put up additional stays in a fore and aft direction. All the derricks on the fore deck were brought aft and fished to the main mast, so as to give it additional strength. The main mast had four derricks, two fore and two aft; these were lashed together so as to make one derrick fore and aft. The lifting gear was now attached to the derricks and the broken propeller lifted on board. The new propeller was then lifted over the side and lowered on to the raft. Care had to be exercised in doing this as the vessel was rolling somewhat, and the risk of one of the blades piercing the ship's skin great. In due course the propeller was slung in the aperture, the shaft again pushed out and the nut put on and driven up hard, and the split pin put in and opened. The tunnel shafting was then rolled into position and coupled up, the stern gland repacked, thus completing the work.

The lignum vitæ bearing for the propeller shaft should have the wood placed in with the grain cross wise.

RUDDERS.—The rudder post very often shears off close to the quadrant; if the break is protruding from the stuffing box, we might be able to clamp the two portions together or cut a fresh key-way in that portion of the post protruding from the stuffing box, fix the quadrant on it and alter the chain leads to suit. If the break occurs in the rudder trunk we should be forced to disconnect the upper portion of the rudder post and attempt to scarf or weld the two portions together. Rudders and temporary rudder posts have been made out of pieces of angle iron and wood with some considerable amount of success.

Assuming that we have no rudder at all, it is possible to steer the vessel by means of a long rope which is towed astern, the rope having a float fitted to its after extremity, and from this guide lines are led to the house pipes on port and star quarter and thence to winches. A lifeboat full of water raised or lowered on each side as occasion may require has the same effect.

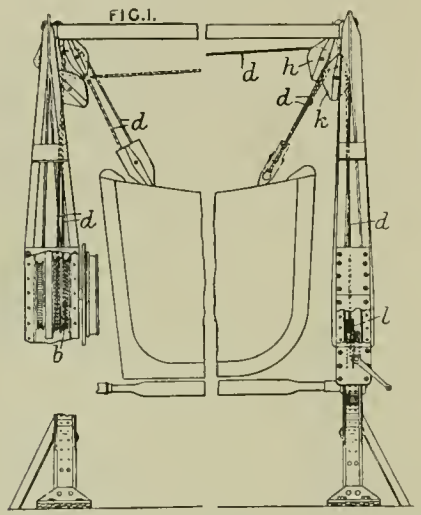
(To be concluded.)

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

22,923. Boat Raising and Lowering Gear.—In frame-davits which are luffed out-board about a horizontal axis, means are provided to enable the boat to be lowered on an even keel when the ship is down by the head or stern. The falls *d* wound side by side on the drum *b* are arranged as usual, but

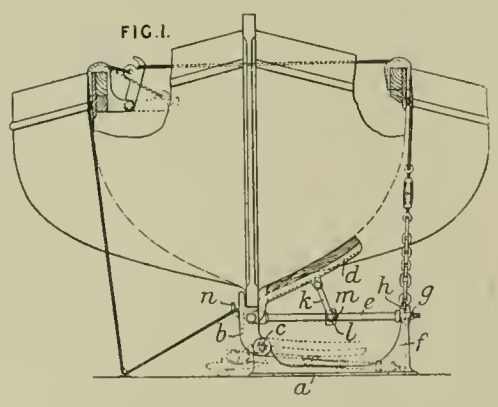
FIG. 1.



the standing part of the fall which passes across the davit-heads, instead of being made fast to the pulley *h*, is led back over a pulley *R* to a drum *l* operated by worm gear. Slight modifications of the arrangement of the standing part of the falls are described.

23,022. Chocks.—The keel of the boat rests on a tumbler *b* pivoted at *c* to a baseplate *a*. The tumbler is normally held by up a bar *e* having a stud *g* which takes across a slot *h* in a standard *f*. A hinged chock plate *d* is also held up by a stud *m* on the bar *e*, retaining a collar *l* connected to the chock plate by a link *k*. On giving the squared end of

FIG. 1.



the bar *e* a partial turn, the tumbler is released, owing to the stud *g* coming into line with the slot *h*. Similarly the chock plate is collapsed as the stud *m* registers with a slot in the collar *l*. The grips, which are arranged as described in Specification 21,629/09, are simultaneously released, owing to the fall of a hook *n* on the tumbler *b*.

23,049. Turbine Gearing. Turbine rotors are built up of a number of short members of channel section which, when secured together or to the shaft, present a surface forming part of the cylindrical surface of the rotor. The short members *a*, Fig. 1, are provided with inwardly projecting flanges *c* and are secured to discs *e*, some of which are reinforced by angle-rings *g*. In a modification, no intermediate discs are used, the elements being directly welded

FIG. 4.

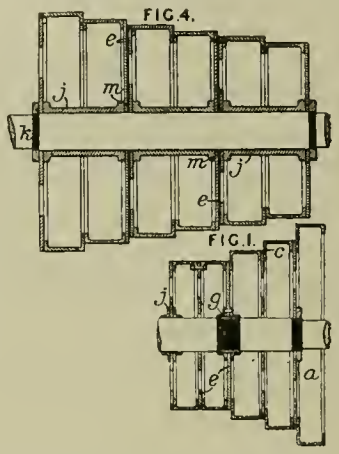


FIG. 1.

together, the complete drum thus formed being secured to spiders at each end in the usual way. The intermediate discs *e*, Fig. 4, may be provided with central distance-pieces *j* encircling the shaft *k*. To allow axial expansion, the rotor may be made up of spaced sections by the insertion of rings *m*.

THE KING'S SHIPS.

We are pleased to welcome Volume II. of that valuable publication "The King's Ships" compiled by Lieutenant H. S. Lecky, R.N., and published by Mr. Horace Muirhead of 31, Craven Street, Strand. "The King's Ships" will be completed in six large quarto volumes, and gives the detailed history of some 4,000 vessels of war, beginning with the *Dragon*, the warship of Prince Sweyn of Denmark, down to the present time. In addition, over 3,000 other vessels are mentioned, the particulars of which are in less detail. As is well-known, in the naming of the ships of the Royal Navy, it is the time honoured custom as far as possible, to let each new vessel bear the name of some illustrious predecessor. Thus we get a continuous pedigree tracing back in some instances through a long ancestral time, of ten, twenty or even thirty ships of identical name, and in telling the story of these ships the author gives us a most vivid history of the British Navy. The collection of the wealth of detail contained in the story of each vessel, must have been a stupendous undertaking, and Lieutenant Lecky has achieved a literary task of immense magnitude with signal success. We can read of our great naval heroes, see them as it were, at every stage of their career and follow them throughout the engagements in which they fought. As a naval picture gallery the work will be unique; there are nearly 3,000 high-class illustrations which comprise a wonderful assemblage of splendidly executed reproductions from contemporary paintings, prints and photographs, rare old engravings and contributions from many sources, portraits of celebrated British Admirals, naval scenes, battle pictures, ships of war and a fine series of coloured plates illustrating the arms and uniforms of officers, seamen and marines at different periods. The work has been executed with great thoroughness. It is an important publication and is a valuable library of British Naval History, and should be among the possessions of all who take an interest in the Navy. It can be safely said that no other book contains the records and pictures to be found here. Volume II. has a splendid photogravure plate of the late King Edward, and among other illustrations, there are five whole page pictures in colour. The ships recorded in the Volume range from *Cadmus* to *Encounter*. The work is produced in three bindings, cloth being the least expensive at £2 2s. per volume, but we understand a concession is made on this price to advance subscribers. For the high-class manner in which the volumes are produced, the cost is very moderate.

The Marine Engineer

And Naval Architect.

LONDON, APRIL, 1914.

THE NAVAL ESTIMATES.

THE presentation of the Naval Estimates to Parliament on March 17th by the First Lord of the Admiralty brought out some points of interest which are of more than ordinary moment. The first point is the fact that the present estimate is the largest for Naval expense ever presented to the House of Commons, and in explaining the matter the First Lord set out, firstly, what the increases were due to and the financial aspect of the Naval policy. Secondly, he examined some of the principal causes at work and showed how the increases either arose out of past decisions or are consequential on standards approved by Parliament, particularly under the heads of oil, air and personnel. Thirdly, he dealt with "materiel," the new programme, the standards of new construction and other matters more or less associated with the main headings into which his observations were divided. There had been a great expansion during the present First Lord's tenure of office which necessarily resulted in a marked annual increase. Comparing the year 1911-12 with 1914-15, it will be found that in the three years there has been an increase of 6¼ millions apart from new construction. This may be divided under three heads:—£2,140,000 extra in pay, wages and victuals, consequent on more men and higher wages; £1,500,000 for oil reserves, which may be taken as capital expenditure, as the oil reserve over 1911 has been increased by this amount; and £900,000 for the air service, which was non-existent three years ago. The remaining £1,750,000 goes to meet the needs of a larger fleet, more costly ships and the increased scientific development of the naval service. Leaving out the oil reserves and air service as special items, there is left an amount of 3¾ millions as the automatic increase on development. Dealing with the horse-power three years ago, the aggregate horse-power was 4,478,000, while the present figure is 6,712,000. Again, the expense of ammunition is increased by £700,000 owing to increase in the number of guns carried, while the fuel item has gone up £600,000 largely owing to an increase in price, but part of which is due to the increased horse-power. Dealing with the number of ships maintained in commission in comparison with those of other powers, he pointed out that the Admiralty were seeking to complete eight battle squadrons by the time the next strongest naval power had completed five. On this subject we cannot help feeling that much disappointment will be occasioned among those who take the broad line of maintaining our rate of construction as an insurance premium in proportion to our risk, in view of the lack of information as to how the gap created by the postponement of the three battleships from the Dominion of Canada is to be filled. It will be remembered that the First Lord in 1912 prescribed four Dreadnoughts to be laid down in 1914 as part of the settled programme. Subsequently the Government thought it desirable to increase the Mediterranean Squadron from four to eight battleships by the end of the year 1915. In making up this programme credit was taken for the Canadian ships. These ships are not forthcoming in 1914, and how is the programme to be completed? Although the acceleration of three ships last year may have partly met the deficiency for the time, this advantage will automatically disappear unless further acceleration is carried out. Judging from the explanation given, it appears that two ships are to be accelerated during the present year and one the following year, but this does not seem to make up for three complete ships originally estimated for but not now forthcoming. We therefore think that if one understands the explanation aright, the solution of the problem as to shortage of construction is by no means satisfactory. Turning to the question of oil fuel, the First Lord gave some interesting particulars as to the advantages of oil fuel which clearly justify the expenditure already made and to be made under this head. He read a statement made by the Chairman of the Royal Commission on Fuels and Engines, from which many points of importance can be taken, and we therefore set it out *in extenso*—

"There is no doubt that, with otherwise similar warships, the one that burns only oil possesses a large excess of speed over that which burns only coal, and even exhibits superiority in this respect over that which burns coal and oil. The radius of action when using oil in place of coal is increased at least 40 per cent. for the same weight of fuel. The use of oil enables a fleet to refuel at sea with great facility. With coal this is impracticable, except under very favourable weather conditions. The special advantage to the British Fleet of not being forced to leave its fighting position in order to refuel need not be enlarged upon. The strength of the British Fleet is thereby increased by at least 25 per cent. (while not adding that percentage of strength to the enemy's Fleet), as so large a proportion of the coal-burning ships have to be absent refuelling. This also leads to a large unnecessary expenditure of fuel going to and returning from the coaling base, and additional wear and tear of machinery. Oil bunkers can be replenished with great rapidity, and without interfering with the fighting efficiency of the ship, and a few men suffice for the work. On the other hand the operation of coaling is lengthy and laborious, necessitating the exertions of the whole of the crew; with the result that the men are physically exhausted by the operation, and the ship is rendered for a time unfit to fight. The use of oil is also attended by the saving of the large amount of labour involved in coal-trimming and stoking, as well as in the removal of ashes, clinkers and soot when coal is burned, and by a reduction in the stokehold of some 55 per cent. Oil gives the great advantage, as compared with coal, of admitting of a very rapid increase of steam production and of eliminating variations of steam pressure due to the necessity for the cleaning of coal-burning furnaces. In a coal-burning ship, after part of the coal has been used, the ship cannot attain her full power without taking men from the guns to trim the coal, whereas the oil is delivered to the furnaces with continuous facility until the whole has been consumed; moreover, oil can be stowed in some spare spaces in a ship from which it would be quite impracticable to bring coal to the furnaces, with

the certainty of still further increasing the radius of action. The use of oil fuel instead of coal makes it possible in every type of war vessel to produce a ship which will fulfil given conditions of speed, armament, etc., on lesser dimensions and a smaller cost. Further than this, the great advantages which liquid fuel presents in the problem of naval design make it possible to obtain vessels of very high speed in relation to their dimensions, which would be wholly impracticable if coal were retained as the sole fuel."

We feel sure our readers will welcome this clear and illuminating statement from an absolutely reliable source as to the merit of oil fuel compared with fuel based on the wide and practical experience obtained on naval ships. Dealing with the estimates as a whole, we think that they will be acceptable to the majority of the people who view their national responsibility from the proper perspective with the exception of the gap in construction defined in the 1911-12 programme being dealt with in some satisfactory and conclusive manner.

THE INSTITUTION OF NAVAL ARCHITECTS.

BY the time this number is in the hands of our readers, the spring meetings of the 1914 session of The Institution of Naval Architects will be in progress in the Hall of the Royal Society of Arts, John Street, Adelphi. The dates over which the meetings will run are April 1st, 2nd and 3rd. The annual dinner will be held on April 1st (Wednesday) in the Grand Hall of the Connaught Rooms at 7.30.

The following papers will be read and discussed during the session :—April 1st, "Some Questions relating to Battleship Design," by T. G. Owens, Esq., Member; "Further Experiments upon Wake and Thrust Deduction," by W. J. Luke, Esq., Member of Council; "Model Experiments on the Resistance of Mercantile Ship Forms," by G. S. Baker, Esq., Member, late R.C.N.C. April 2nd, "The Present Position of Diesel Engines for Marine Purposes," by J. T. Milton, Esq., Vice-president; "Results of Trials made on a Small Diesel Engine, in which accurate Indicator Diagrams were obtained by means of a new form of Optical Indicator," by Professor W. E. Dalby, M.A., B.Sc., F.R.S., Associate Member of Council; "The Use of Superheaters and Superheated Steam in Mercantile Steamers," by Harry Gray, Esq., Member; "Elasticity and Endurance of Steam Pipes," by C. E. Stromeyer, Esq., Member; "Note on the Foster Strain Meter, and some Data obtained therewith," by W. R. Gerald Whiting, Esq., Associate-member; "Description of a Torsion Meter with Visible Scale," by Dr. K. Suyehiro, of Tokyo University. April 3rd, "On the Design of Steamships from the Owners' Point of View," by Leonard Peskett, Esq., Member; "The Stability of Ships in Damaged Conditions," by P. Y. Brimblecombe, Esq., B.Sc., Student; "Safe Stability and the Economical use of Water Ballast in Ships," by A. T. Wall, Esq., Associate-member; "Further Results of Research Work in connection with the Post Graduate Scholarship in Naval Architecture," by Arthur Cannon, Esq., Associate-member; "An Instrument for the Measurement of Velocity of Roll," by H. E. Wimperis, Esq., M.A.

The usual evening meetings are not to be held this year, but a reception will be given on April 2nd at 9 p.m. at the Royal United Service Institution, to which ladies are invited.

Order for Arch Patent Steamer.—A further order for a steamer to be built on the Arch principle of construction patent, the proprietors of which are Mr. Maxwell Ballard and Messrs. Swan, Hunter & Wigham Richardson, Ltd., has been secured and will be built for Newcastle owners by Messrs. Craig, Taylor & Co. The vessel will be for the coal trade and has been specially designed as an Arch type collier by Mr. Maxwell Ballard. She will have an exceptional specification and will be available for coaling the fleet and will have a speed of 10 knots.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondents.)

Portsmouth Dockyard.

THE tale of the Estimates, said a dockyard official on their publication, is fair to middling, not anything out of the way, while it might have been much worse. The average number of men to be employed and the wages bill have both gone up to an appreciable extent, indicating that there is no likelihood of less work during the coming year. Of the four new battleships to be laid down, one is as usual to be built at Portsmouth, and judging by the amount set apart for beginning work on her, £132,090, it is not likely that she will be commenced until the late autumn. So far, it is not known whether we are to have the one ship of the *Queen Elizabeth* type which is to be built, or another *Royal Sovereign*. One reason why the date for laying the keel-plates is fairly certain to be late is that the *Royal Sovereign* herself is not so far advanced as it was hoped she would be. In some quarters, indeed, it is believed that the first instalment of £215,000 which was voted for her will not be spent before the end of the financial year. So far as large repairs are concerned, in addition to the *Invincible* and *Kent*, already in hand, on which it is estimated that £34,000 and £31,000 will be spent respectively this year, the *King Alfred* and *Monmouth* are to be taken in hand, and sums of £15,000 and £38,610 are taken for these ships under the head of wages. The items under Vote X. which affect Portsmouth yard indicate further progress on what is already begun, but not any immediate fresh developments. As £5,000 is taken to prepare for the reception of the Royal Naval War College at Greenwich, there can be no longer any doubt about its removal from this port. Its transference will cause some heart-burning, but it has been generally recognised for some time that the original argument for bringing the college here in 1906 has lost much weight since the Fleet has made Portland its head-quarters. In the yard, an additional £120,000 is to be spent on the completion of the two new locks, and for the lengthening of No. 14 dock, £41,000 is taken, leaving in each case a sum of £7,000 to complete these works. The next largest item is £5,000 to begin the reconstruction of the buildings destroyed by fire, while £3,000 is to be expended on repairs at No. 1 smithery, £2,000 on a storehouse for heavy guns, and £1,000 for renewals to docks, slipways, jetties, etc. Outside the yard, an additional sum of £4,000 is allotted for the Bedenham magazines for high explosives, and £1,000 out of the £10,500 which is the estimated cost of the new block for warrant officers at the naval barracks. The total sum taken under the works vote for Portsmouth falls little short of £178,000. After all the rumours about closing the college at Osborne, it is satisfactory to learn from the estimates that it is intended to spend a sum of £109,350 on extending and improving the arrangements for the accommodation and instruction of cadets. Of this amount nearly £40,000 is to be spent this year, and among other things the construction of a swimming bath is provided for. The oil fuel depot at Forton creek, on the Gosport side, which is to be completed at a cost of £158,000, will have £36,000 more spent on it this year to provide the additional storage plant which has become necessary. The new estimates have naturally overshadowed everything this month, but note must also be taken of the commissioning of the *Iron Duke* on March 10th. This was just twenty-six months since she was laid down on January 15th, 1912, so that she fully maintained the good record of the yard for speedy construction. Another matter of interest was the departure of the Australian submarines, which occurred on March 2nd, when they started on their long run of 13,000 miles by way of the Mediterranean and Suez Canal. Several more vessels are expected here shortly for minor refits before the summer cruise, but there is plenty of work in hand for everybody.

Devonport Dockyard.

A year of full but not abnormal activity seems to be foreshadowed for this yard by the new Navy Estimates. As usual, one battleship will be laid down, and the sum taken is

sufficient to begin her in November. Allowing for the increase in cost, the £115,899 taken for the new ship is comparable with the £112,999 taken for the *Lion* five years ago, which was also begun in November, and with the £160,073 taken for the *Warspite* two years ago, which vessel was laid down in October. It is manifest from this comparison that the First Lord's promise to accelerate two of his four new battleships does not apply to the Devonport vessel, and presumably refers to the two contract ships. No light cruiser is to be put in hand during the coming year, according to present arrangements, but the *Aurora* is to be completed and the *Cleopatra* advanced. The latter has now been begun, her keel being laid on February 26th. A pleasing incident connected with the beginning of the *Cleopatra* was the presentation to Mrs. Langford Clarke, the wife of the popular Captain of the Dockyard, who drove the first rivet into the keel-plate, of a framed picture of the vessel as she will appear when completed. The *Cleopatra* is shown flying the signal "Chase me" to some destroyers, a challenge which typifies the confidence placed in her speed and steaming capabilities with oil fuel. There is not a large repair list for the coming year, the *Donegal* being the only big ship, with £77,343 to be spent on her. An uncommon item, however, is the completion of the *Reliance* as a repair-ship. This vessel was formerly the steamship *Knight Companion*, and was purchased last year. Turning to the other votes in the Estimates apart from shipbuilding, a matter of great interest to this port is the provision made for the re-opening of the Royal Naval Engineering College at Keyham. It will be remembered by many readers of this journal that the College was closed on July 31st, 1910, with the passing out of the last term of cadets for the engineering branch of the Royal Navy, under the system of separate training, which was superseded by the common entry scheme of 1903. It is to be re-opened in April for the reception of the lieutenants from Osborne and Dartmouth who have elected to specialize in engineering. Formerly a captain, R.N., was in command, but now the college will be under an engineer-captain, R.N., for whom a salary of £900 a year is provided. Presumably the first occupant of this post will be Engineer-Captain Charles G. Taylor, who since August last has been supervising the re-organization of the establishment. He will have a staff of seventy-four persons altogether, including six naval engineer officers, a naval instructor, a draughtsman, forty-two mechanics, etc., and twenty-one naval ratings, while altogether the college is to cost £21,300 in the new financial year. The official announcement on March 2nd that the hull of submarine A. 7 had been abandoned was not a matter of surprise, and a funeral service three days later over the spot where the vessel went down closed the story of this lamentable disaster, the cause of which will probably never be known. There are not a large number of vessels here at the moment of writing, but many will arrive in a few days for Easter leave. The *Centurion* is in hand for her turbine defects, and the *Collingwood, Thunderer, Devonshire, Amphion* and *Bellona* are refitting. The *Marlborough's* trials are still in progress, and so far have been most successful.

Chatham Dockyard.

There is not anything uncommon or striking in the Estimates, so far as they concern this yard. They indicate, indeed, a normal year on the improved scale of recent times. The additional light cruiser which had been expected is not allotted to the yard, probably because the total number is four instead of eight, and only one of these is to be built in a public yard instead of five, which was the number allotted last year. Our new construction, therefore, is limited to one submarine, which may be a sister-ship to *F.* 1, now building here, or perhaps a larger boat. The sum allotted for beginning her is £45,214, whereas for beginning *F.*1 last year only £17,288 was taken. This large difference may be indicative of quicker progress or a superior craft. The vessels completing or to be advanced are the light cruisers *Ariadne, Calliope*, and *Conquest*, with five submarines. There are also a rather larger number of ships to be taken in hand for large repairs. These include the battleships *Cornwallis* and *Duncan*, for which £114,669 is taken, and the cruisers *Leviathan, Lancaster*, and *Sapphire*, for which £36,012 is to be voted. Of these vessels, the *Leviathan* and *Sapphire* have been for some time in hand, and the refits of the other three will be carried on into 1915-16. It cannot be said that Chatham has not its fair proportion of repairing work, although we have had more ships here in some previous years. When, however, the construction entrusted to the yard is taken into account, there is no likelihood of a lack of work for this establishment. Turning to the works vote, therein this yard does not figure largely. Indeed, there is only one item, a sum of £4,150 which is allotted to the extension of No. 5 machine shop. This is exclusive of a sum of more than double that amount which will be spent on machinery. Another item concerns the oil fuel stores in the Medway. To provide the further accommodation necessary, a sum of £50,000 is allotted, and there will yet remain £12,000 to be spent in 1915-16. For machinery, pipes, and other plant connected with the storage works, £17,000 has been taken, and it seems probable, from what Mr. Churchill has said on this subject, that further extensions may be carried out, for which there is ample ground in the vicinity. On the whole, a very satisfied feeling has been created by the Estimates, especially as the wages vote also shows a considerable increase. The recent decision of the Admiralty that the establishment should be added to is being carried out. A number of men have been already placed on the list, and it is expected that during this financial year further effect will be given to the official decision. With the certainty of continuous employment and a dension in view, there should be no difficulty in finding sufficient suitable applicants, or obtaining as many men as are required.

An important change in the staff of the yard has been brought about by the departure of Mr. J. J. King-Salter for Australia on his appointment as Chief Constructor at the Royal Australian Naval Dockyard at Cockatoo Island, Sydney. He had been a constructor at Sheerness since July, 1907, when he was transferred here from the Cape of Good Hope. The good wishes of his colleagues will be with him in his responsible new post. Considering their previous want of experience, the Australians have shown marked enterprise in embarking on the construction of a cruiser, the *Brisbane*, and three destroyers at Sydney. The vacancy at Chatham has been filled by the appointment of Mr. H. J. G. Blandford, Assistant-Constructor, at present serving as overseer for the hull of the battleship *Barham* at Messrs. John Brown's works on the Clyde.

Sheerness Dockyard.

We have been passing through a quiet time during the close of the financial year, with the harbour emptied of many vessels and nothing extraordinary doing in the yard. Special interest attached to the cruise of the Fifth Battle Squadron which began on February 23rd, as this was the first time the squadron had put to sea this year or since the change of flag officers in the Nore division. A change of some consequence was the transfer about the same time as this cruise of the battleship *London* from Sheerness to Devonport. The *London* had not a very good reputation from a disciplinary point of view, rumours of discontent among her crew being common, and it was understood that the transfer to Devonport and the recommissioning there on February 18th with a new captain, commander, and crew were not unconnected with this state of affairs. The publication of the Navy Estimates for 1914-15 has not caused so much interest here as at the other ports. No new shipbuilding is allotted to Sheerness, and the amount of refitting work is rather small. A sum of £11,862 is taken for the overhaul of the torpedo gunboat *Circe*, which was built here over twenty years ago, and was recently paid off from the Mine-Sweeping Flotilla. Of course, a good share of the £94,310 set aside for the repair of torpedo boat destroyers will be spent at this yard, which has an importance of its own in this respect. Under the works vote, there is the sum of £26,800 taken for new accommodation for seaplanes in the Medway. A foot-note to this item stating that its scope has been extended and the estimate increased from £9,150 is indicative of the energetic way in which the naval air service is being developed under Mr. Churchill's *régime*.

Lieutenant W. Highfield, who was in charge of the salvage lighter *No.* 94, which was sent to Devonport to assist in trying to raise submarine *A.* 7, returned here on March 3rd and resumed duty in the commander's department. He expressed his appreciation of the manner in which the tugs *Alliance, Firm*, and *Escort* had been handled by their respective masters during the operations, and specially men-

tioned the splendid way in which Mr. Sambells, master of the *Escort*, handled his vessel when working the wires around the submarine. Manifestly it was through no lack of skill or exertion on the part of the salvage officers and men that the unfortunate submarine was not raised.

Pembroke Dockyard.

There were no surprises for Pembroke in the Estimates, but on the whole they have been well received, and point to another active year. The new construction programme is easily summed up, as during the coming year one ship will be begun, another will be advanced, and another will be completed. For the first-named, a sum of £72,961 is taken, indicating that the keel will not be laid until late in the year. The ship to be advanced, the *Carysfort*, was only laid down on February 25th, and £200,873 is allotted to her. The vessel to be completed is the *Cordelia*, already afloat, and she takes the largest sum of all, *viz.*, £310,982. There are many people who would like to have seen two light cruisers instead of one put in hand this year. Probably if the programme had not been cut down from eight vessels of this class to four there would have been two, as there were last year. In addition to the three cruisers mentioned, the *Nottingham* appears in the Estimates, but no money is taken for her, as she is to be delivered before the end of the financial year on March 31st. She carried out her acceptance trial satisfactorily on March 3rd. Those who were present on board during the trial speak highly of her seagoing qualities, and say that she behaved very well in the rough weather which prevailed at the time. Messrs. Hawthorn, Leslie and Co. were the machinery contractors, and from them the plant has now been taken over by the Admiralty. By the time these lines appear the vessel should be ready to hoist the pennant for duty in the First Light Cruiser Squadron. Concurrently with her departure from Pembroke, Mr. A. Nicholls, who has been serving here as an assistant constructor since October 31st, 1905, will sever his connection with the yard. In future only one instead of two assistant constructors of the first class are to be borne on the establishment. This change is the outcome of the decline of Pembroke as a building yard.

NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS.

An appeal has been made by the Council of the North-East Coast Institution of Engineers and Shipbuilders, with a view to raise an endowment fund of £25,000, to place the Institution on a sound financial basis, and to some extent independent of the annual subscriptions of the members, with respect to the educational work which has been carried on hitherto with, it would appear, too lavish a hand consistent with the ordinary income due to subscriptions, hence the Balance Sheets during recent years have not been so healthy-looking as members and friends of the Institution would wish to see them. The Society was formed thirty years ago, and its present membership is 1,200. The graduate section is composed of 200 juniors, who enjoy the privilege of home rule within their own sphere, having a President and Council to guide their operations and arrange papers and discussions suitable for the section. Last year they had eight papers read before an average attendance of sixty-seven. One scholarship of £50 per annum, tenable for two years, is awarded on results of examination in connection with the graduate section.

The value of a Scientific Society to the community is unquestionable; members contribute from their knowledge and experience for the benefit of their co-members, language by them is used, not for the purpose of concealing thought, but of contributing to the sum total of knowledge for the benefit of all, while to the rising generation such a society is of the greatest value, and as this is made a special feature of the work on the North-East Coast, it is highly commendable that the desire to elevate the junior section should in some measure have led to the present position of the Institution in making an appeal to all who are interested in the progress of shipbuilding and engineering and the advancement of the rising generation in the mechanical arts and crafts allied to the industry.

BREAKDOWNS AT SEA.*

Boilers.—Boiler troubles can be brought together under three heads—Leaking joints and tubes and stays; pitting and corrosion; cracks and local collapse. Leaky joints and seams may be due to the unequal expansion of the top and bottom of the boiler, caused by defective circulation. The circulation may be improved in certain cases by removing the row of tubes immediately above the furnaces. An ordinary cast-iron house drain pipe hung vertically between the combustion chambers will promote the circulation. Rivet holes not being quite fair, and rivets that have been allowed to get cold before being riveted over, often give considerable trouble in the after working life of the boiler. Attempting to caulk the rivets is only a waste of time, better to cut them out, rimer the holes fair, and re-rivet. Leaking tubes are caused by allowing the necks of the tubes to become covered with scale, and this sets up unequal expansion between the tube and the tube plate. The admission of cold air into the furnace has also a tendency to start the tubes leaking. Firemen should always be instructed to open and close furnace doors with the minimum delay consistent with economical firing.

Burst Tube.—In the event of a tube bursting the fires should be immediately drawn out, and the water level in the boiler kept normal by pumping in water from the ballast tanks or sea. The safety valves should be eased so as to reduce the pressure to nil. A tube stopper is then inserted into the tube. With the ordinary type of stopper this necessitates a man going into the combustion chamber to adjust one end, which is a very hot job, and the risk of being burnt great. With the patent tube stoppers the whole operation may be conducted from the outside of the boiler with very little trouble. Burst tubes occur in donkey boilers more frequently than in the main boilers, since the donkey boiler feed water is nearly always salt water or water containing sewerage, which is bound through time to eat into and destroy the tubes. Stay tubes being about twice the thickness of ordinary tubes, they seldom burst; generally they last the life of the boilers. When the question of re-tubing an old boiler comes up, it is often difficult to decide how many to renew. If we have several burst tubes scattered here and there it would be advisable to renew all the plain tubes. If we were only going to renew one or two tubes situated in the centre of a nest we should have to draw them out by means of plate washers and a drawbar, etc. If renewing all the plain tubes the easiest way would be to cut right through them with a rod chisel and quarter hammer about 1 in. from the tube plate, the portion of tube retained in the tube plate being afterward ripped with a flat chisel and hand hammer. After removing all tubes that have been cut out of the boiler, the opportunity should be taken to thoroughly clean the tube plates, stay tubes and other portions of the boiler that are difficult to get at when all tubes are in place. The new tubes should now be placed in position and then expanded. Formerly this was done by driving conical drifts into the ends of the tube. The present practice is to use a special tool, which is known as a tube expander. It consists of three or four small rollers partly projecting out of the circumference of a mild steel encasement. A tapered mandrel is placed in the centre, and driven in while being turned round, thus causing the rollers to revolve and at the same time expanding the tube securely into the tube plate. Leaking stays should be caulked or fitted with a grummet and plate washer. Broken stays should be renewed at the first opportunity, as there is always the possibility of other stays in the same locality breaking, and the combustion chamber back would then buckle, crack or collapse.

Corrosion.—Care must be taken to guard against pitting and corrosion, which are set up owing to the impurities in the boiler water. The impurities usually occurring in boiler water are sea water mixed with the feed, air or gases in solution, oil or grease, lime or soda (intentionally added to feed). The objections to sea water in the feed are at once seen if we look at its chemical analysis. Average composition. Sodium chloride, 77 per cent., magnesium chloride, 10 per cent. (excessively soluble and never deposits unless the density

*An address delivered by Mr. R W. Thompson before the Graduate section, N.E.C. Inst. of Engineers and Shipbuilders. (Continued from page 329).

is up to 7/32); magnesium sulphate, 6 per cent.; calcium sulphate, 4 per cent., calcium carbonate, ¾ per cent. (about 5 per cent. lime salts deposit at 35 sq. in. by gauge = 281°F.); other substances by diff., 2¼ per cent.; 1/33 part of sea water is solid matter ∴

$$\frac{2240}{33} = 68 \text{ lbs.}$$

of solid matter per ton. It is the calcium sulphate which separates out practically pure and forms a hard crystalline deposit that is the worst constituent of sea water. In the first place oil is liable to get on to the heating surfaces and form a dangerous non-conducting film, which may result in a serious accident, owing to the overheating of a plate and its subsequent collapse. Secondly, oil, especially animal or mineral, is liable to decompose at high temperature, and like magnesium chloride, but to a very much greater extent, to form acids which corrode and destroy the heating surfaces with the same dangerous results. Oil in boiler water has a tendency to cause priming. An occasional scumming of the boiler will, however, prevent it from accumulating.

Air or gases are liable to set up corrosion and rusting, and it is possible that they may lead to explosions in the feed tanks or filters, or in any part of the system not constructed to stand high pressure.

The objection to the use of lime is that it may form a non-conducting deposit like calcium sulphate, and cause a serious loss of efficiency or overheating and consequent collapse.

Tests for Boiler Water.—Salinometer test for density; nitrate test for salt; phenolphthalein test for alkalinity; litmus paper test for acidity. The salinometer is an instrument which floats at various levels, according to the density of the water. For marine use it is graduated from 0/32—4/32, 4/32 being considered the maximum density at which it is safe to operate a boiler, having in view a margin of safety against "salting the boiler," which would be disastrous. In practice it is best to keep the density as low as possible.

Nitrate test for salt is extremely delicate. A few drops of silver nitrate solution will give a white precipitate with even the slightest trace of chloride or common salt. It is often just necessary to taste the water to detect the presence of salt, the palate is not nearly as sensitive, however, as silver nitrate. Acidity is probably the worst evil in boiler water; salt is not of much moment unless it is present in sufficient quantities to produce damaging deposits, and oil may, more or less, be kept out by efficient filters, etc. The presence of acid, however, even in the smallest quantity, will set up dangerous corrosion and to safeguard against this the boiler water should be kept slightly alkaline by dissolving lime in the feed water or sometimes by common soda. Soda is never used in water-tube boilers, as it has a tendency to cause priming, and also it combines with the oil and forms into viscous lumps or balls. The solution of lime, generally spoken of as milk of lime, is put into the feed water at regular intervals, through a special cock fitted to the air pump.

The phenolphthalein test for alkalinity is very delicate; a few drops of this solution produces a deep red colour in a sample of boiler water that has any trace of alkalinity. Red litmus paper turns blue if water is alkaline; blue litmus paper turns red if water is acid; methyl orange turns red if water is acid. To prevent corrosion in boilers it is usual to introduce zinc plates in metallic contact with the furnaces along the line of fire bars, and between the combustion chambers. The zinc plates should be made from best rolled zinc, say, 12 in. by 6 in. by 1 in., and having a ⅞ in. hole through for connecting them to the studs which are screwed into the furnaces to receive them. The zinc plates between the combustion chambers are suspended from the stays by specially constructed hangers.

A mixture of white zinc and paraffin oil is very beneficial to any local corrosion or pitting. Before applying this mixture the plate should be scraped thoroughly clean. External corrosion may be due to weather, and to leaving damp ashes against boiler ends; this can be prevented by cementing the boiler ends and fitting guards so that the damp ashes do not come into contact with the boiler plates. Incidentally the heat radiated from the boiler to the tank top causes vapour to rise which causes corrosion of the ballast tanks, particularly the tank top. This may in some measure be prevented by covering the tank top with bitumastic.

Again, some firms leave the boiler room tank off, which is a source of great annoyance in heavy weather with seas coming into the stokehold and washing coal, ashes, etc., into the tank and thus choking up the strums. The tanks may be galvanized and left dry.

Cracks are liable to occur anywhere about the heating surfaces. They may be due to the overheating of the plate, the admission of cold air, fatigue of material or laminated plates. The cracks may be prevented from spreading by drilling a small hole through the plate at each end of the crack, and then screwing a bolt or rivet into the hole and riveting it up. Cracked tube plates may be repaired by chain riveting or by fitting a spectacle piece. Furnace cracks may also be chain-riveted but it is not advisable to attempt chain riveting with a crack over 8 in. If the crack exceed 8 in. it is best to fit a patch until arrangements can be made to have it electrically or autogenously welded. The landing edges of the plates in the combustion chamber are often cracked or burned due to the excessive heat. Formerly this would have meant renewal, but the welding systems can build up the landing edges and weld the cracks, thus making the boiler almost as good as the day it was made. Furnace collapse is brought about by overheating due to deposits of scale or oil. It is now considered good practice to trammel the boiler furnaces once a month, so as to be able to detect any signs of fatigue or collapse.

Defective valve gear is the most frequent cause of breakdown in cargo winches. The slide valve spindles are everlastingly stripping, if we adopt that type of valve and nut which will allow the valve to be adjusted without removing the steam chest cover. Eccentric straps are, as a rule, made too thin and with an insufficient amount of bearing surface. The wheel teeth occasionally break and are replaced by special teeth dove-tailed into the wheel rim, or by tap bolts screwed into the rim and then cut off and filed up to the correct profile. The weight of the engine shaft should not be taken by the top, or removable portion of the brass, since if the bolts are torn from the framework the shaft will have to be shored up from the hatch combings.

(Concluded.)

Waygood Lifts on the "Britannic."—Electric lifts will enter largely into the internal economy, working efficiency and refinement of comfort on board the new White Star *Britannic*, launched at Belfast on Feb. 26th. Altogether, including those for passengers, store, mail and service purposes, as many as eleven Waygood electric lifts will be installed, very similar to those fitted on the *Olympic*. Work is proceeding on the *Britannic* lifts in the recently much-extended factory of Messrs. R. Waygood & Co., Ltd., Falmouth Road, London. These include four first-class and one second-class passenger lifts which will be of thoroughly up-to-date type, fitted with cages of handsome design to suit the surroundings, arranged with safety gear beneath same to prevent descent in case of failure or undue stretching of the ropes. The cages will run between guides of well round turned steel so as to give the smoothest possible running. The winding gear will be of the very best description with steel worm cut from the solid, and worm wheel constructed with cast-iron centre and phosphor bronze rim and teeth, fitted with double ball thrust bearings. The gear will be enclosed in cast-iron worm box which will form an oil bath, with the worm arranged beneath the wheel so as to be always running in oil. A turned and grooved winding drum will be provided, and the whole machine mounted on one cast-iron bed plate. The motors will be of special design and suitable for ship work. The lifts will be controlled by pilot switch in the cage, operated by self-centring detachable handle, and the controllers will be of the maker's latest type. Special provisions are being made to guard against over-running in either direction, in case of inattention on the part of the attendant, or failure in the controller. Electrical and mechanical locking gear will be fitted to the trunk doors to ensure that the latter shall be shut before the lift can be operated, and to prevent the door being open unless the cage is opposite same. The other lifts to be installed consist of three stores lifts, controlled by "Up," "Down" and "Stop" pushes from the decks served by the lifts, also two service lifts and one lift for mail purposes.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent).

The Dover-Ostend Route.

THE Belgian Government has published some interesting figures regarding the work of their steamships, which run in conjunction with the State railways and provide three services each way daily between Dover and the Belgian seaport. Unfortunately, like most Government statistics, they are somewhat stale—relating as they do, not to the working of 1913, but to that of 1912. Anyhow they are quite the latest available. We can compare the results of three years, as follows :—

	1910.	1911.	1912.
Number of passages made .	2,302 ..	2,184 ..	2,204
Cost of each passage (frs.)	1,408 ..	2,729 ..	1,608
Receipts per passage (frs.)..	898 ..	787 ..	827
Working expenses per kilometre, frs.)	— ..	23·74 ..	14
Receipts per kilometre (frs.)	— ..	6·84 ..	6·79
Deficit per kilometre (frs.)..	4.43 ..	16·9 ..	6.8
Number of passengers carried	222,410 ..	181,040 ..	190,61y

It will be seen that though the figures are still, in regard to numbers carried, considerably below the totals of the exceptional year 1910, they show a great increase on those of 1911. The business is therefore increasing steadily. The apparent loss on working is also increasing. This is, of course, due to the fact that larger, faster and generally more costly vessels are employed on all the services than formerly. No doubt it is the fact that such vessels are available to the passenger that keeps the numbers up, in spite of heavy competition from lines to other Continental ports. But, though the apparent loss is heavy, it would be decidedly wrong to look at the apparent loss alone. The steamships are a great national asset and, though it does not and cannot appear in the figures quoted, they undoubtedly bring much money into the country. They feed the railways with persons who tour the country and with travellers who pass through into the inland states of the Continent. At the same time the numbers of tourists who are attracted by the ships do not stop their good work with their expenditure on railway fares. They patronize the hotels and the shops, and visit all that is to be seen in that remarkable little country. Thus it can hardly be said that, even on present figures, the magnificent steamships which the State Railway has now provided are anything but a wise investment. The value however would be increased by the disposal of the older tonnage, so that the travelling public need not fear the possibility of finding an old fashioned vessel out of reserve appointed for their particular voyage.

Wireless.

During the last days of February an unfortunate rumour was spread by means of a confusion as to a wireless. In consequence of a message transmitted through by the same Company's s.s. *Trautenfels*, it was believed that the Hansa line s.s. *Wildenfels* had been lost in the Bay of Biscay. The *Wildenfels* is a fine and large steamship and the report was received with considerable surprise and concern. Next day, however, the report was corrected. The *Wildenfels* had never been in trouble at all. What really happened was that the s.s. *Ekliptika*, of Copenhagen, a vessel of some 2,200 tons, was lost in the Bay of Biscay, and with her were drowned or died of exposure some dozen persons. The wireless messages related not to an accident to the *Wildenfels*, but to the rescue by her. But the incident may be a useful lesson, if one be needed, to show those who frame wireless messages that they should be careful to leave no ambiguity as to the identity of the ship which wants help.

The Advent of the Big Ship.

The Cunard liner *Aquitania* will be at work by the end of next month, and the White Star liner *Britannic* is already in the water. The era of the 50,000-ton ship in the Atlantic is assuredly come. The *Cap Trafalgar*, of the Hamburg South American Line, a vessel of 18,000 tons, is now on her maiden voyage to the River Plate, and thus we see increase of tonnage in all directions. The *Ceramic* of about the same tonnage has made successful voyages out and home to Australia. This increase of size is causing those who are charged with the management of canals and waterways to set seriously to work to enable their conveniences to bid for the best class of traffic. The Suez Canal, when opened in the year 1869, was but 72 ft. wide and gave passage to ships of not more than about 25 ft. draught. Now it is held desirable to contemplate a depth of 40 ft. over the whole channel, but the advantages of the Cape route for the Australian trade are being pressed in certain quarters and the South African harbours are being deepened too. Though there are disadvantages for coaling to ships going out by the Cape route as compared with those going through the Red Sea, it is said that the actual distance in mileage between London and Melbourne shows not more than a single day's steaming to be saved by taking the canal route, and it would seem likely that the P. & O. and White Star lines will considerably add to the popularity of their steamers over the long sea route in consequence.

Then comes the Queenstown question. A deputation from all parts of Ireland waited upon the Prime Minister on the 18th March to protest in the strongest possible manner against the withdrawal of the Sunday morning call of the Cunard west-bound steamships at Queenstown. They alleged—though one can hardly see how the figure can be reached—that the cessation of the visit means an annual loss to Ireland of a sum of half a million a year. Be that as it may, the Government could hardly take any other course than it did when the Cunard people asserted that their nautical advisers had reported on the danger of the call under certain conditions, backing up their assertion with references to the experience of the *Mauretania* in February, 1913, and again in the month of November in the same year, and this protest of the steamship company was supported by confirmatory reports from the experts of the Admiralty and the Board of Trade on the dangerous nature of the harbour for long steamers. On the occasion in February the *Mauretania* really had rather a narrow escape. A strong south-south-westerly gale was blowing at the time when she anchored in the harbour, and it forced her, in spite of the strength of the ebb tide, right across the channel, where she lay with her draught of 35 ft. and only some 38 ft. of water under her, unable to move till the flood tide carried her head to the southward. This meant a delay of four hours and might have meant a great deal more than delay. So serious was the matter thought that the White Star Company has withdrawn their *Olympic* also from the Queenstown call. Mr. Asquith has promised that a commission of some sort shall consider the grievance. But it can hardly be expected that even for an Irish " wrong " the property of and the lives entrusted to the big steamship Companies shall be risked by Government order. If the authorities were to attempt any pressure of the kind it is obvious that the contractors would throw up the engagement to carry the mails, and things would be worse for Irish interests instead of better. In the old days when steamships were of half the sea speed of the big Cunarders and when the bar at Liverpool held vessels up for a great part of the tide, there was a great advantage in making the call at Queenstown. There was probably no danger in paying visits to the port for vessels of the biggest type carrying the mails in the year 1903, when the latest mail contract was arranged. For at that time the *Campania* and *Lucania* of 625 ft. in length were the giants of the Cunard fleet. But things very much altered when the 790 ft. *Lusitania* and *Mauretania* came on to the station. Whilst Liverpool, and even Southampton, have been spending money steadily to deepen their channels so as to keep pace with the growth of big steamships, Queenstown has never moved, and the six fathom channel is dangerously narrow in certain material places. Between Chicago Knoll and harbour rock there is only 600 ft. of this depth and to the east of Turbot Bank only 800 ft. These widths are not considered safe for steamships of present dimensions under certain conditions. Then again inside the harbour the six fathom area is restricted. And, of course, it must not be forgotten that six fathoms is by no means the full depth that ought to be provided for modern Atlantic liners—40 ft. is much nearer the limit, and on that basis the areas would of course be

smaller still. If Queenstown is to make a bid for the restoration of the call Queenstown ought to do something for herself in the way of dredging.

Views of the Burmah Oil Co 's *Twingone* after the fire at Tuticorin, Southern India, last year.

(See "A Heavy Claim."—Fleets of the Mail Lines.)

One Result

of the recommendations of the Conference on the safety of life at sea has been the issue by the Board of Trade of a new set of regulations in regard to lifeboats. These rules deal first of all with the freeboards to be insisted upon in the case of decked lifeboats. Well-decked boats must have a reserve buoyancy of not less than 35 per cent. In the case of flush-decked boats the scale is based on the depth of the craft, a minimum freeboard being insisted upon. This comes out roughly at somewhere about one-fifth of the full depth of the boat. When the boats undergo their tests they are, of course, to carry their full equipment, and in addition they must have on board weights amounting to 165 lbs. to represent each person of their designed complement. Then rules are given as to the provision of adequate means for clearing with sufficient rapidity the decks of boats of each of these types from water. Finally, instructions are given as to the buoyancy, freeboard, structural strength and general design to be insisted upon for open lifeboats with collapsible topsides where these are allowed to be substituted for the ordinary type of boat.

The Hamburg-American Line

has now published its report for 1913. During the year nine vessels were acquired, two of them being purchased and the rest built. On the other hand, four vessels were sold and one, the ill-fated *Icilia*, missing off the Straits of Magellan, was lost. Against these diminutions of the fleet may be put the fact that nineteen vessels are still under construction, and two of these are the New York mail steamers *Vaterland* and her sister, of each of which the tonnage will be well over 50,000 tons. The tonnage of the fleet now amounts to some 1,360,360 tons, which is, of course, not only the largest individual tonnage in the world, but is also a total considerably larger than that of the great combine controlled by the International Mercantile Marine Co. Upwards of £100,000 was added to the reserve of the Company as a result of the recent issue of additional capital, for the new shares were issued at a premium and that, of course, could hardly be treated as divisible amongst the shareholders. It is interesting to notice that the company has taken a 25 % interest in a new undertaking formed to promote the development as a commercial port of the well-known naval depot of Emden. During the year 463,571 passengers were carried by the ocean steamers of the Company on some 1,109 voyages, whilst just under 9,000,000 sea miles were traversed by these vessels. The gross earnings of the Company were 63¾ millions of marks—well over three millions sterling. Three millions sterling were left for distribution after the interest on priority loans was deducted. About £87,000 was carried to the insurance fund; £2,150,000 was taken for depreciation and to strengthen the Competition and Strike Defence Fund; and £760,000 only taken for dividend. This sum, however, enables a 10 % distribution to be made to the shareholders.

The "Dover Castle,"

one of the three vessels of the Union Castle Line's "D" class—8,000 ton twin screws of a most comfortable and attractive type—has unfortunately sustained a serious, and it may be feared costly, accident when entering the harbour of Port Elizabeth on the early afternoon of the 16th March. How the accident occurred has not yet transpired, and no doubt the matter will be the subject of a public enquiry. But presumably the ship was at the time in charge of a local pilot. Anyhow she struck on Roman Rock and sustained serious damage forward, No. 1 hold being full to the sea level and Nos. 2 and 3 having also considerable quantities of water in them. Pumps were despatched from Natal to aid in clearing the ship and the passengers were transferred to another of the Company's steamships the t.s.s. *Guildford Castle*, so that though the casualty is likely to involve a good deal of damage to cargo, the ship seems safe enough.

A Heavy Claim

against the underwriters was naturally made in the case of the steam tanker *Twingone* of the Burmah Oil Co., which, as some readers may remember, was burnt at Tuticorin, Southern India, in October of last year, when laden with about 2,000 tons of oil. The fire continued to burn for many weeks, an explosion actually occurring on board some three

weeks after the original outbreak. When the fire was finally subdued the damaged hull was towed to Bombay, where it was found that, though the decks had collapsed amidships, the machinery was not seriously damaged. It was at first and very naturally thought that she would after such an experience be condemned as a total loss, but it is now announced that the owners and underwriters have agreed that the owners are to keep her, and pay all costs of salvage and repairs for a payment of 77 per cent. on the insured value. As the value of the ship for insurance purposes was taken at £43,000, it will be seen that the cost of making her good will be considerable indeed. By the courtesy of one of our subscribers we are able to give illustrations of the vessel after the fire.

The Cunard Company

may be proud of the performance of its *Lusitania*, which has now, of course, been at work on the Atlantic for some seven years, for on her last eastward voyage between noon on Thursday, the 12th, and noon on Friday, the 13th March, she steamed 618 sea miles. The eastward voyage of course shortens the apparent day to something not much over twenty-three hours for these fast vessels and so her average speed works out at 26.7 knots. She has now done about ten miles in the day better than her own best on any previous occasion and four miles better than her Tyne-built sister, the *Mauretania*, has ever done.

The Loss of the Oklahoma.

Details of the results of the enquiry into the loss of this American-owned and American-built tank steamer have now become available. The inspectors who conducted the inquiry report that no blame can be attributed to the navigators or managers of the ship, nor can it be said that there was any perfunctory inspection. The ship was in good condition, well found and properly manned. The casualty occurred in a heavy sea, the ship instantaneously breaking in two amidships at a time when that part of the vessel was unsupported, whilst the bow and stern were buoyed up by the heavy seas. It would seem, however, that she must have been of insufficient strength longitudinally, whilst probably the arrangements made for ballasting her were of a kind to put exceptional strains on her fabric under the circumstances in which she was eventually placed.

METALLIC LIFEBUOYS ON CLYDE FERRIES.

IN order to meet the requirements of the new Board of Trade regulations as to life-saving appliances, the Ferries Committee of the Clyde Trust have agreed to the proposal of their officials that sixteen metallic lifebuoys shall be provided for each of the small steam ferries plying across the Clyde, and most of these are now installed. The metallic buoys which have been adopted are the well-known copper corrugated buoys patented and solely manufactured by Messrs. Joseph Sankey & Sons, Ltd., of Bilston, which have for many years vied with the ordinary cork and canvas type of lifebuoys for use on board river passenger and ocean-going steamers. Although the first cost of the copper buoys is considerably more than the cork and canvas article, their greatly increased life-time and the very low cost of their upkeep are considerations which more and more appeal to shipowners and the seafaring world generally. With proper care they last as long as the ship carrying them, without entailing any periodical repair. They are one-third lighter than cork buoys and they never get objectionably heavy with paint and water lodgment, as in the case of the latter. The metallic buoys have a most extensive vogue in ships trading in hot climates or in service where excessive changes in temperature are met with, and they are in use throughout the extensive fleets of the Irrawaddy Flotilla Co., and the India General Navigation Co. Of the vessels plying on, and trading from, the Clyde those belonging to Messrs. William Sloan & Co., the Campbeltown Steam Packet Co., David MacBrayne, Ltd., etc., are almost entirely equipped with the Sankey lifebuoys. The latter Company, during last year ordered no fewer than one thousand of them and other shipping concerns who have now to augment the life-saving capacity on board their ships are doing so in this form.

SURVIVAL OF THE SAILING SHIP.

APROPOS of the order recently booked by Messrs. Ramage & Ferguson, Leith, for a sailing ship of 5,000 tons deadweight capacity from the East Asiatic Co., which will be the largest sailing vessel ever constructed in Scotland, it will be of interest to enumerate what has recently been done, and is being done, in the production of sailing ships, which on all hands are being spoken of as rapidly becoming extinct. While this no doubt is true enough as regards ships owned in the United Kingdom, it is otherwise as regards the Continent of Europe—France and Germany especially—and of the United States. The advent of motor power as auxiliary to the main agent of propulsion, *viz.*, spread of canvas, has in recent years exercised a reviving influence in the building and management of sailing ships, and in almost all the larger ships on hand, and recently turned out, auxiliary motor machinery forms a feature. This is true of the new vessel referred to as about to be built by the Leith firm. While she will have five masts and will carry an area of 53,000 sq. ft. of canvas, she will have a Diesel oil engine capable of driving her in calms at 7 miles per hour. In 1912 a French yard turned out the five-masted barque *La France*, of 5,806 tons gross, for a Rouen firm, in which auxiliary machinery is fitted to drive twin screws. This vessel is at present on her maiden voyage from the Clyde to New Caledonia. Although described as "the largest sailing ship afloat," other vessels built previously excel her in this respect. In 1908 Messrs. Harland & Wolff, Ltd., Belfast, built the six-masted schooner *Navahoe*, of 7,718 tons gross, for the Anglo-American Oil Co., London. In 1906 the firm of Rickmers, Bremerhaven, produced the auxiliary screw five-masted barque *R. C. Rickmers*, of 5,548 tons gross. In 1895 the firm of Tecklenborg, Geestemunde, produced for F. Lassig, Hamburg, the five-masted sailing ship *Potosie* of 4,026 tons gross. The Lassig firm had two sailing ships built for them in Germany in 1912, and they have recently given an order to German builders for four four-masted sailing ships, each of about 4,000 tons. As regards sailing ship building on the Clyde, the statement has recently been made that no sailing vessel has been turned out from a Clyde yard for the past twelve years. This, however, is quite inaccurate, because, for British ownership alone, a goodly number have been produced during the period. The steel barque *Kildalton*, 1,784 tons gross and 1,591 nett, was built by the Ailsa Shipbuilding Co., Troon, in 1903, for Messrs. J. Hardie and Co., Glasgow; the steel ship *Castleton*, 1,971 tons gross and 1,812 nett, was also built in 1903 by Messrs. A. Rodger & Co., Port Glasgow, for Messrs. T. Beynon & Co., Ltd., Cardiff; the steel barque *Inverlyon*, ex-*Gostwick*, 1,827 tons gross and 1,687 nett, was built in 1904 by Messrs. A. McMillan & Son, Ltd., Dumbarton, for Messrs. George Milne and Co., Aberdeen; the steel four-masted barque *Archibald Russell*, 2,385 tons gross and 2,181 nett, was built in 1905 by Scott's Shipbuilding and Engineering Co., Greenock, for Messrs. G. Hardie & Co., Glasgow; the steel barques *Rendova*, 1,432 tons gross and 1,295 nett, and *Sunlight*, 1,433 tons gross, and 1,298 nett, were both built in 1907 by Messrs. Napier and Miller, Ltd., Old Kilpatrick, for Messrs. Lever Brothers, Port Sunlight. The two latter are the last sailing vessels built on the Clyde. It has been prophesied that in about twenty years from now the sailing vessel will be extinct, but in view of above facts it seems very unlikely to prove true, even of British-owned and built ships, and still more unlikely as regards Continental ships. There are still somewhere about 160 sailing vessels owned in Britain, only forty-seven of which belong to Scotland. Messrs. George Milne & Co., Aberdeen, are the largest individual owners, possessing a fleet of no less than fifteen vessels. Twenty-seven belong to Glasgow, two to Greenock, one to Dundee and one to Leith.

A PAPER was recently read before the N.E.C. Inst. of Engineers and Shipbuilders by Sir John Biles on life-saving appliances.

WE understand Messrs. D. Anderson & Son, Ltd., have supplied their "Siderosthen" solutions for coating the bunkers, stokeholds, etc., of the R.M.S. *Olympic* whilst the vessel was overhauling at Southampton in January.

B.I.S.N. COMPANY ENGINEER OFFICERS' DINNER.

The above is reproduction of a photograph of an interesting dinner held in Glasgow, on February 27th, organized by Mr. A. M. Macalister under the auspices of the engineers of the British India S.N. Co., who are meantime resident in Scotland, retired from active service, on holiday leave, or standing by new steamers building. The chair was occupied by Mr. Jas. Williamson, and the vice-chairs by Messrs. A. McIndewar and Chas. Mackay. Lord Inchcape, Chairman of Directors and Lord Kilbracken, one of the directors, were the chief guests. The chairman, in proposing the toast of "The British India Company," expressed the great pleasure they felt in welcoming the chairman of the Company and one of the directors; not only those who were present but the engineers throughout the fleet would appreciate the honour done to them that evening. He expressed regret that several, whose faces he hoped to see, had been unable to attend their gathering, but each and all were imbued with the spirit of it. The pleasure of meeting in a social capacity with those with whom they had served in days gone by to talk over experiences and changes was brought within their reach that evening. The firm basis on which to build up a business was to have as the corner stones, mutual esteem and consideration. An employer who was generous, yet strictly just, would be loved and respected, and such an one would win voluntary assistance beyond mere monetary value. The Company they served was based on such lines, and they were proud to belong to it, and they could recall many acts of consideration and grace exercised on behalf of employees, while the most recent concession of full pay for six months after three and a half years' service in India was a great one. They had often met Lord Inchcape and were glad he was present with them that night, as every occasion added to the respect and esteem in which he was held. Lord Inchcape, in acknowledging the toast, said he cordially appreciated the good feeling expressed towards the British India Company, and he was delighted at the opportunity to meet so many engineers; he sympathised with them in the duties demanded of them, recognising the many difficulties and discomforts connected with their work. The unity of feeling which was referred to as prevailing throughout so that everyone worked in harmony for the good of all, he felt proud of, and it was the desire of the directors to consider the comfort of the employees and to give as liberally as the exigencies of the service admitted. The recent concession made implied that from the time of a young man joining the Company till completion of his term of service qualifying for a pension, he would be on full pay, The great services rendered by the Company's engineers were recognised and he felt that no more loyal body than the officers and engineers of the British India Company was to be found. Mr. Chas. Mackay proposed "The Guests," to which Messrs. P. W. Armour, John Clark and Donald Black responded. The programme of the evening was added to with great acceptance by Messrs. R. J. Smith, C. Mackay, J. Simpson and others, with song and recitation.

Romantic Use of Old Steamer's Bell.—Mr. Peter Denny, of the well-known shipbuilding firm of Dumbarton, has presented a steamer's bell to the Free Church Mission in South Africa, where it will be used to call the worshippers to church. The history of the bell is of special interest. It originally belonged to a vessel called the *Lochfine*, which was built in 1847 by Messrs. William Denny and Brothers for the Loch Fyne herring trade, and was afterwards transferred to the Dumbarton Steamboat Co., as a luggage boat, trading for many years between Glasgow, Dumbarton and Greenock, When the steamer was broken up after nearly sixty years' service the bell was handed to Mr. Denny as an interesting relic of the twelfth vessel built by his firm when in their third year of existence.

MARINE MOTOR NOTES.

At the meeting of the Royal Society of Arts in February, presided over by Sir Boverton Redwood, an interesting paper was read by Mr. Ormandy dealing with the possibilities of obtaining a motor spirit at a reasonable price from coal, from a raw product which may yet be discovered in the earth, or from vegetable, either in the form of alcohol or some similar hydrocarbon. At the meeting of the Institute of Marine Engineers when Mr. Bost read his paper on charcoal, reference was made to the distillation of a suitable motor spirit from wood or from fibre matter, and in various other directions experiments are being carried on with a view to ascertain if a suitable spirit can be obtained at a price which can be placed upon the market to compete with petrol. It has been pointed out that a fuel could not be economically produced from vegetable matter grown upon soil capable of furnishing articles of food, but would require to be such a substance as could be grown on waste land or as a by-product of cereal or other refuse. The paper read by Mr. J. Veitch Wilson is of interest and value to all manufacturers and users of oil, both fuel and lubricating, and it comes very appropriately at the present time, when the subject is exciting considerable attention. Recent experience has shown that British engine builders have been successful in arriving at suitable metals for motors and oil engines, as is evidenced by the fewer cracks and defects in vital parts, assisted no doubt by a more careful attention to design, especially in the way of water cooled spaces.

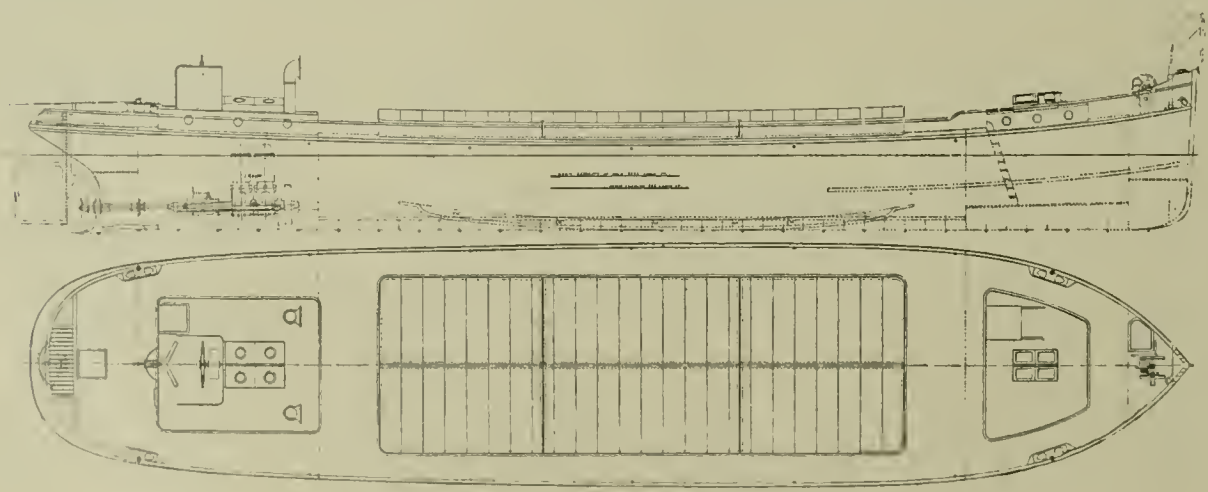
The launch of the twin-screw motor ship *Falstria*, by Messrs. Harland & Wolff on the Clyde, for the East Asiatic Company, and of the *Ife* by Hawthorn & Co. on the Forth, for Messrs. Elder, Dempster & Co., in addition to others built elsewhere indicate the rising record which promises to crown the current year. The *Falstria* is 381 ft. by 50 ft., with a tonnage of 4,500, and is to be fitted with two sets of Diesel motors, each set consisting of six cylinders with about 1,250 b.h.p. The deck machinery is to be electrically driven. The *Ife* is about 140 ft. by 25 ft. by 10 ft., and is intended for local traffic on the West African coast; she is also twin-screw, and is being fitted with two sets of Bolinders engines, each of 120 i.h.p. There are two motor vessels in course of construction of over 6,000 tons for Messrs. Elder, Dempster & Co. on the Clyde. These are to be fitted with Diesel engines being built in the Glasgow works of Messrs. Burmeister, Wain & Co. The *California* is noted as running in the Atlantic trade with cargo and passengers, calling at Boston. This vessel of 4,800 tons was built at Copenhagen, engined by Messrs. Burmeister & Wain with two sets of four cylinders, about 21 in. diameter by 29 in. stroke, giving 2,700 h.p. The auxiliary machinery for cargo work is steam-driven, the steam being supplied by an oil-fired boiler. The electric light is obtained from a dynamo driven by Diesel motor.

Another addition to the fleet of the Scottish Motor Coasting Shipping Co. is the *Innisvera*, built by Messrs. Chalmers, and engined by Messrs. Beardmore. The vessel is about 120 ft. long, with a cargo capacity of 400 tons. The oil engines are calculated to develop 200 b.h.p., the sizes of cylinders being 4 in. by 14½ in. There are two motor winches for cargo work, of two tons and one ton lift respectively, on single gear; they are also fitted with double gear. A very interesting law case is still pending between the Marquis of Linlithgow and the North British Railway Co. on account of the excavations for shale for the manufacture of oil, trenching too closely on the Union Canal. The Canal Act admits of compensation to the proprietor where the excavation of minerals has to be suspended for the safety of the canal, but the question has arisen whether shale is mineral within the meaning or interpretation of the Act.

The visit of the oil tanker *Sebastian* to the Thames recently, when an opportunity was afforded of seeing her from the Royal Albert Dock entrance, was an event of considerable interest, both from her outside appearance and her internal equipment. She was built by the Caledon Shipbuilding Co., Dundee, the motor engines being built at Stockholm. The deck machinery is by steam power and the auxiliary boiler is oil fired. The Caledon Company has another vessel in hand similar to the *Sebastian*, named the *Selerie*. The *Siam* (East Asiatic Co.) appears to be moving in regular service from Copenhagen to the East and South American ports, and in the shipping reports the names of the various motor vessels now in commission may be seen as evidence of their well-being.

THE LONDON MOTOR LIGHTERAGE CO., LIMITED.

THE completion and trial trips of the first motor barge for the London Motor Lighterage Co. will shortly be followed by another of similar dimensions, and as the trade develops other barges will be added to the fleet. The first of these is 86 ft. 6 in. × 18 ft. × 6 ft. 6 in., to carry about 110 tons, built by Messrs. Braby and named *The Match*. The second by the same builders will be called *The Flame*, and it may be anticipated that a successful service will be established upon the Thames, when so many other ports at home and abroad have found the power barge to be a reliable carrier. The motors, constructed by Messrs. Plenty & Son, of Newbury, are of the British Kromhout marine oil engine type, about 70 b.h.p.; the estimated consumption of oil is 0·62 pints



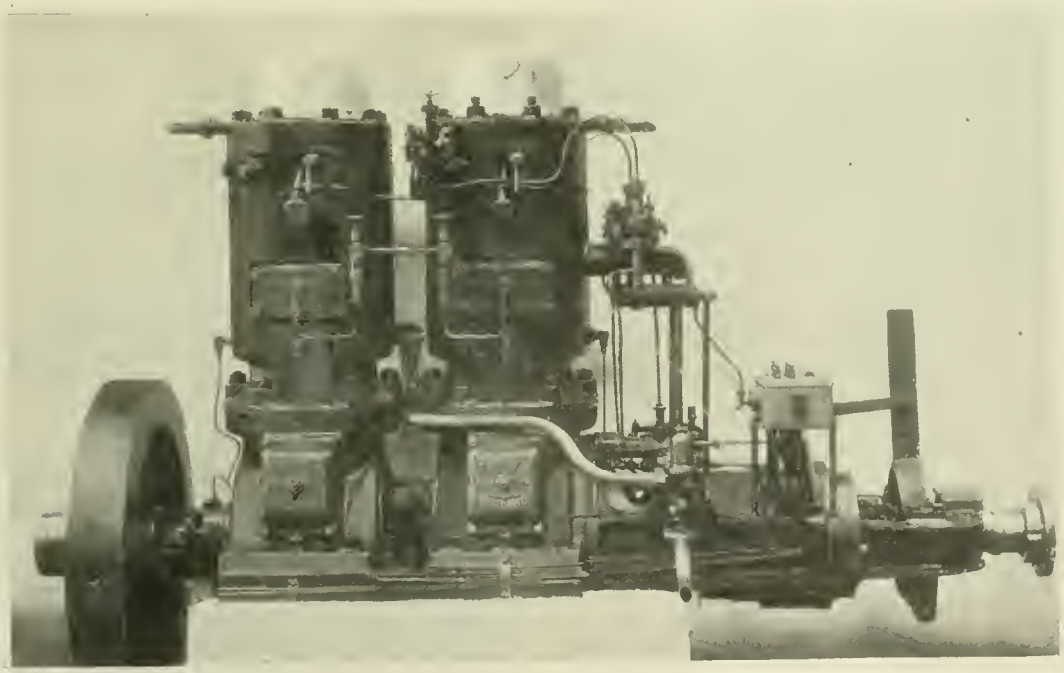
Plan of *The Match* Motor Barge, length, 86' 6" over all. Beam, 18' Depth, 6' 6"

The Match on Trial Trip.

per b.h.p. at a loaded speed of seven knots. The propeller is a solid one, worked by through clutch gear. The Company has secured a wharf and warehouse at Maidstone for cargo purposes with another terminus at Stepney. The motor barge, being intended to trade between the Thames and the Medway, will be in competition with the sailing barges so well known on the river, but the obvious advantage of the motor-propelled vessel will enable *The Match* to perform the journey between London and Maidstone in greatly reduced time. The trials which were held in the beginning of March were successfully run, and we are indebted to Messrs. Perman, the contractors, for the illustrations herewith reproduced.

BRITISH CORPORATION REGISTRY OF SHIPPING.

THE chairman of the British Corporation, Mr. Robert Clark, presided over the annual meeting held in Glasgow, on February 25th. The report submitted showed that the amount of tonnage supervised and classed had been increasing and in the coming year the amount booked for classification gave promise of a further increase. The Society since its formation had ever kept in view improvements in ship construction, and had been instrumental in introducing new features based upon scientific principles and adding rules and regulations, consistent with strength and durability, for the more economical carriage of cargoes in vessels classed by the Corporation and built under the supervision of the surveyors. The departures from former practice had been acknowledged by British and Continental authorities as worthy of imitation and had been commended, such of itself being an acknowledgment of the valuable work done by the Corporation. It was difficult to forecast the results likely to accrue from the recent international conference on life saving. There was a considerable advantage in international action in that all vessels would alike require to comply with the regulations; on the other hand it was difficult to frame regulations to meet possible alterations and modifications in design; such might even become the means



The Kromhout Marine Oil Engine of 70 h.p. fitted in *The Match*

of stultifying the object in view, or of hindering progressive advancement. Safety on the sea was in the main as great as safety on the land, and while it was wise to adopt all reasonable precautions to prevent loss of life, a certain amount of risk must of necessity remain. The staff of surveyors had a word of praise accorded for the excellent and loyal support given in carrying out their duties.

Mr. Fred J. Stephen, chairman of the Technical Committee, submitted his report upon the various constructional questions which had been considered and resolved upon during the year. The rules and regulations had been under discussion and revision as usual year by year, and the committee had agreed that the main essentials required no revision. Reference was made to the oil tank steamers fitted with cylindrical vessels to carry the oil and the improvement thus effected in respect to construction and facility in dealing with cargoes. The committee had under consideration the internal combustion engine in its various aspects; in order to maintain the object of the rules and keep up-to-date in dealing with such motors in view of the most recent experience. Sir Nathaniel Dunlop, Mr. F. Henderson, Mr. W. H. Raeburn and Col. Saxton White also took part in the proceedings.

NON-CONDUCTING MATERIAL FOR DECK STEAM PIPES.

THE question of how to cover steam pipes which are in exposed places and subject to weather conditions, has often been discussed with a view to arriving at the best material to use and the best method of securing it to withstand the adverse influences which prevail, as a rule, against the non-conductor in general use. The practice sometimes adopted in cheap steamers of leaving the pipes uncovered, is not one to be recommended, as the saving in first cost is by no means economy in the long run. The most difficult pipes to deal with are the deck steam pipes, exposed as they are not only to weather influences, but to the deck washing hose and other elements which militate against the machinery on deck. Felt covered with canvas has been frequently used to cover these pipes, but it soon perishes and gradually falls off. Asbestos rope lapping is more fit for the purpose, but it is liable to get torn and broken away, and if this occurs the lapping peels off readily, and even when covered with canvas, the latter does not prove to be a protection for any length of time. One likely covering for deck steam pipes is granulated cork moulded in lengths to fit each diameter of pipe, secured by bands, then coated with a bitumastic solution and a lapping of canvas, and finished with another coating of bitumastic solution. Cork has been largely used for covering brine pipes to retain the cold in connection with refrigerating plant where bunkers or other warm spaces interpose between the machinery and the cold chambers. Subject to its ability to resist the action of heat without perishing, cork should be equally good for retaining heat, while it also admits of being securely fixed and is less likely to be destroyed by rough usage than the more friable materials; experimental trials have been made with cork covering within the last few years on deck steam pipes and the results appear to have been satisfactory. One of the objections in connection with a more general adoption of this material has been the apparent difficulty of obtaining early delivery of other than stock sizes. Most of the moulded cork covering is manufactured on the continent of Europe, and comparatively recently, after considerable urging on the subject, local manufacturers have taken it in hand, but whether the cost will meet the requirements of the market or not will depend on the charges involved in the price of the material, the necessary machinery for the manufacture and labour expended upon it.

The Board of Trade announce that on February 21st the number of lives saved by the rocket life-saving apparatus on the coasts of the United Kingdom since 1870 reached the total of 10,000. The rocket life-saving apparatus has been maintained and managed by the Board of Trade since 1857. There are now 344 stations equipped with the full rocket life-saving apparatus and 266 stations equipped with lifebelts and lifelines and other appliances for saving life.

A NOVEL SHIP CLEANER.

THE cleaning of a ship's hull is an operation which it is necessary to dock the ship to perform under the usual procedure, and more time is spent in the dock than would be required to paint the ship's hull only.

An interesting and ingenious method has been devised by Mr. F. G. Browne, of Malvern, Victoria, and the apparatus connected therewith is being put on the market by The Torpedo Submarine Ship-Cleaner Co., Ltd., of Melbourne, the London office of which is at Cecil Chambers, 76, Strand.

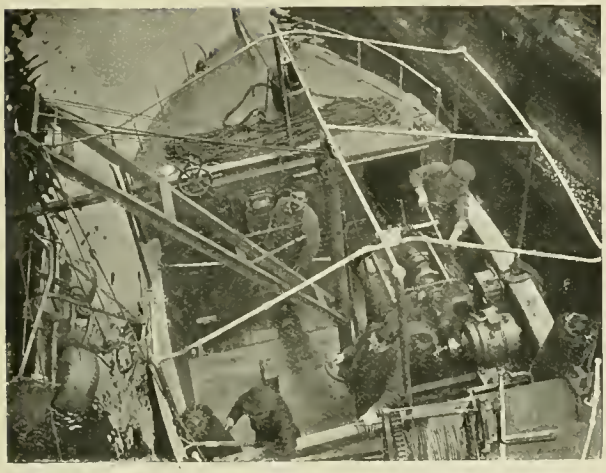
The complete plant for carrying out this new method is carried on a flat-bottomed wooden barge about 30 feet long by 12 feet beam. In the after end of the barge is an engine room, amidships is an electric winch and forward is a small forecastle. The engine room contains a petrol-electric generating set, a four-cylinder petrol engine of 28 h.p., direct coupled to a 10-kilowatt dynamo, the propeller motor and a switch and distribution board. The adjoining illustrations show the cleaner ready for work, and in operation on a ship's hull.

The electric winch amidships is of a special type. There are four barrels, two for the suspension ropes, one for the electric cable supplying current to the brush motor, and one for raising and lowering the jib. The power for the whole is obtained from a compound reversing motor.

The actual cleaning gear consists of a framework, carrying a revolving brush in front and a propeller behind. Between this is a motor of the submersible type, which drives both the brush and thrust propeller. The brush is driven by chain gearing from an intermediate shaft, which is itself driven through worm gearing by the motor; the thrust propeller is driven by concentric reducing gear. As this portion of the apparatus works under water, the motor and gearing are enclosed in a water-tight casing, and the framework is constructed throughout of brass.

The power is transmitted to the submersible motor by means of a triple-core rubber-covered cable. This

The Torpedo Submarine Ship Cleaner.



The Cleaner at Work.

passes through a gland in the motor case, the other end being coiled on the drum in the winch already referred to. The three wires of the core, line, armature and shunt are connected to three slip rings on the end of this drum, and thence by means of brushes to a starter.

The brushing apparatus is suspended by four steel ropes, which pass through the end of the jib to the winch. Means are provided for raising or lowering the back pair of ropes independently of the front pair, thus enabling the angle of suspension of the brush to be altered at will.

The method of cleaning is as follows :—The barge is moored fore and aft alongside the vessel to be cleaned, and is kept about six feet away, by means of booms. The jib is then lowered until it touches the vessel's side. As a result the brush is pressed hard against the side of the vessel. The brush motor is then started and the brushing gear is lowered. As soon as the propeller enters the water the pressure of the brush against the side is increased. The action of the propeller keeps the brush pressed firmly against the side, even when cleaning under a sharply inclined counter. Floats are fixed upon the framework of the brushing gear to assist the action of the propeller, by reducing the water weight of the machine. The depth to which the brushing is immersed is registered by means of the depth gauge upon the winch. As the cleaning may frequently have to be done at night, plugs have been provided for supplying current for clusters of lamps to supply light.

It is clear that a considerable saving of time can be effected by utilizing this invention, as the work can be carried on whilst the vessel is coaling, loading or discharging ; it is stated that a vessel of about 400 to 500 feet with average draft can be cleaned in about seven hours.

An opportunity was recently afforded us of witnessing the apparatus in operation on a ship's hull, the demonstration proving the efficacy of the cleaner in carrying out the work for which it has been designed.

Mr. J. W. Isherwood delivered a very interesting lecture on the 18th March, before the Institute of Shipbrokers at the Merchants' Hall, St. Mary Axe, on the "Various types of cargo vessels and their construction."

INSTITUTE OF MARINE ENGINEERS.

Annual Meeting.

THE twenty-fifth annual meeting of the Institute of Marine Engineers was held at the Liverpool Street Hotel, London, E.C., on Thursday, February 26th, Mr. Thomas L. Devitt presiding. The annual report showed that the membership of the Institute at the close of the financial year stood at 1,408, a nett increase of fifty-eight during the session. The total sum to the credit of the City Premises Fund amounted to £8,193 5s. 8d. The foundation stone of the building was laid on October 29th, 1913, by the Lord Mayor of London (Sir David Burnett, Bart.), and considerable progress had been made with the work. The *Titanic* Engineering Staff Memorial Fund had realized the sum of £2,940. Of this amount £300 had been handed over to the Southampton Memorial Committee for the erection of a memorial at that port. An agreement with the Royal Merchant Seamen's Orphanage had been made, under which the Institute would have the nomination of one eligible child each year, and the Institute would also be represented on the board of management of the orphanage. Other items of the Institute's work were dealt with under the heading of papers and discussions, transactions, visits to works, Lloyd's Register scholarship, essay awards, Denny gold medal, experimental department, junior section, library and reading room, Board of Trade advisory committee, Royal Naval Reserve, etc., etc. The obituary list included the names of two past presidents, the late Sir William White, K.C.B., and the late Sir David Gill, K.C.B. In submitting the revenue account and balance sheet the hon. treasurer stated that the total income from all sources during the year was £1,430. There was a credit balance of £339, and after adding entrance fees, a total of £451 12s. 5d. was added to the revenue account during the year, that account now standing at £4,279. The amount spent on papers and discussions was £497. The reports were adopted on the proposal of Mr. H. A. Ruck-Keene, seconded by Mr. A. E. Battle, who, together with the chairman, congratulated the members on the excellent position of the Institute, and on the work accomplished during the year.

A vote of thanks to the retiring president (Mr. Devitt) was proposed by Mr. A. Boyle and seconded by Mr. Geo. Adams.

The scrutineers (Messrs. P. Smith and C. Hudson) reported that as a result of the ballot, the following office bearers and members of council were elected for session 1914-15: President, Sir Archibald Denny, Bart., LL.D. ; Hon. Treasurer, Mr. Alexander H. Mather ; Hon. Secretary, Mr. James Adamson; Members of Council, Messrs. A. E. Battle, P. T. Campbell, B. P. Fielden, H. A. Ruck-Keene and W. T. Seaton (the names being given in alphabetical order).

Mr. W. E. Archer was re-appointed hon. solicitor, and Messrs. J. Clark and A. Robertson as hon. auditors.

The meeting concluded with a vote of thanks to the Chairman, on the proposal of Mr. R. Leslie, R.N.R., seconded by Mr. W. T. Seaton.

THE "BRITANNIC'S" ENGINES.

THE three-screw propellers of the *Britannic* are operated by combination machinery consisting of two sets of 4-cylinder triple-expansion reciprocating engines operating the wing shafts, and a low pressure turbine of the Parsons type driving the centre shaft. The steam, after passing through the successive cylinders of the reciprocating engine, flows normally into the turbine, and although the pressure at entrance is only about 10 lbs. absolute, as compared with about 200 lbs. at the reciprocating engines, the exhaust turbine enables the whole of the energy in the exhaust steam to be utilized before it passes to the condenser. Thus the turbine, notwithstanding the low initial steam pressure develops about 18,000 h.p., which is slightly more than the power developed by each of the two reciprocating engines. The result is very much higher economy than is possible with reciprocating engines only. Messrs. Harland & Wolff have made a speciality of the combination type of machinery, and have completed, or have in hand, such machinery for 450,000 h.p. The *Britannic* has a most powerful set of such combination machinery, and the turbine, which has been made entirely at the Belfast Works, is the largest marine exhaust turbine yet made, the weight of the turbine complete being close upon 500 tons.

The turbine exhausts its steam into two condensers, but provision is made by means of a special valve so that the exhaust steam from the reciprocating engines may pass direct to the condenser instead of through the turbine to the condenser. This confers the advantage that no reversing or astern turbine is necessary on the centre shaft. The astern driving of the ship, and, therefore, all the manœuvring in port, is done by the reciprocating engines on the wing shafts. The "change over" from driving ahead with all three propellers to operating the wing shafts, as in the ordinary twin-screw ship with reciprocating engines, is effected almost instantaneously. In manœuvring, the ship corresponds exactly so far as the manipulation of the machinery is concerned to a twin-screw vessel. There are in the ship twenty-nine boilers, of which five are single-ended, the remainder being double-ended. These are distributed in six boiler rooms separated by water-tight bulkheads and by coal bunkers athwart the ship between the two inner skins, and up to a level far above the load water line. Thus there are practically three division walls between each boiler room, with a very considerable intervening enclosed space. In all there are 159 furnaces in the ship. There are four funnels, which rise to a height of about 180 feet from the bottom of the ship. There is a complete system of auxiliary machinery throughout the ship, and very complete arrangements have been made in connection with the pumping of the compartments. It is possible independently to pump any compartment, and the valves in connection with the pumping can all be operated from one of the decks far above the water line.

Messrs. Wailes, Dove & Co.'s patent "Bitumastic" Covering has been applied to the tank tops in the boiler rooms, passages between boiler rooms and in the pump rooms, and The Beldam Packing and Rubber Co have fitted their "Excelsior" metallic rings (duplex type) throughout the piston rods and valve spindles of the main engines of the *Britannic*. Their "Pilot," "Coolie" and other semi-metallic packings and "Pilot" jointing are also being supplied for use on the vessel.

AERO AND MARINE EXHIBITION.

THIS exhibition, which was opened at Olympia on March 16th, for ten days, was full of interest and had a good share of visitors, many of whom became customers at the stalls of exhibitors. The aero machines and vessels on view have already been made familiar to those who have followed the progress of aeronautics, but the opportunity was given, and taken advantage of fully, to study at close quarters all the details of the different makers represented—quite two dozen in all. The complete specimens of aeroplanes ready for service were ranged in ample spaces and admitted not only of minute inspection, but, in many cases, of entering the seats of the pilot and of the would-be passenger. Of such were Messrs. J. Samuel White & Co.; The Graham White Aviation Co.; The Air Craft Manufacturing Co.; The British & Colonial Aeroplane Co.; Sopwith Aviation Co.; The Blackburn Aeroplane Co.; A. V. Roe & Co.; Nieuport Limited; Vickers Ltd.; Clement Bayard; Hamble River, Luke & Co.; Bleriot Aeronautics; Eastbourne Aviation Co. The large number of model aeroplanes exhibited under the auspices of the Royal Aero Club occupied almost the entire length of the building, on tables under the gallery, and were evidently much appreciated by crowds of visitors. The machinery for motor craft was particularly interesting, and the descriptive prints enabled the enquiring visitor to note the intention of the small details on the exhibits and note various improvements. There were some fine specimens of motor launches and larger vessels shown by Messrs. The Ailsa-Craig Motor Co.; Boulton & Paul; J. W. Brooke and Co.; W. H. Dorman & Co.; Hamble River, Luke and Co.; Moonbeams Ltd.; Nieuport Limited; Seamless Steel Boat Co.; Taylor, James & Bates; G. L. Thomson; John I. Thornycroft & Co.; Wolseley Tool and Motor Car Co. A large assortment of motors was displayed, giving a wide range of choice, and, in addition to the above-named firms, were the following exhibitors:—Messrs. The Alverston Motors; Aster Engineering Co.; Austin Motor Co.; Brazil, Straker & Co.; Day Motor Co.; Dixon Bros. & Hutchinson; Evinrude Motor Co.; W. D. Fair & Co.; Gleniffer Motors; Markt & Co.; Milnes; Daimler; Mercedes; Norris, Henty & Gardners; Parsons Motor Co.; Perman & Co. (British Kromhout); Phœnix Motor Co.; Record Engineering Co.; Ripault, Leo & Co.; Sophus Berendsen; Geo. Spicer; J. Tylor & Sons; W. Austin Webb; and Whiting, Ltd. Several of these firms showed sets of oil motors coupled to dynamos specially suitable for emergency lighting or power plant for steamers, as fitted on the upper deck, and coming into more general use for this purpose, especially as it is now more general to have the auxiliary boiler placed on the same level as the main boilers and in the stokehold, in preference to what was formerly advocated, to place it on the upper deck, so that in the event of the stokehold being flooded, steam might still be available for auxiliary purposes. The advantages offered by the oil motor and dynamo, connected on an upper platform for emergency, are obvious. The turbine oil motor has been long looked for at an exhibition, and, from recent rumours, expectation was high that it would appear on view at Olympia. The difficulty of procuring a suitable metal for the manufacture appears to be overcome. The oil companies, who have set themselves specially to the supply of motor oils for firing and lubrication, were represented, and showed samples of their various kinds of manufacture suitable for different types of motors; so also were represented the manufacturers of accessories for the different machines, boats and cars.

The Imperial Merchant Service Guild.—By the unanimous vote of the Management Committee of the Guild at their first meeting since the recent annual meeting, Captain T. V. Walker and Captain A. B. Toms have been re-elected as chairman and vice-chairman of the Committee respectively. Both gentlemen have been actively identified with the work of the Guild for many years past, and have taken a prominent part in the different matters concerning the welfare of the nautical profession and of the merchant service as a whole, in which the Guild is constantly engaged.

LIFTING GEAR.

THE use of lifting appliances aboard steamers is so largely of a special character that a more or less intimate knowledge of the conditions is necessary to obtain the most suitable materials and provide the best arrangement. The gear supplied is frequently deficient in many respects, not altogether the result of maintaining a low first cost in fitting out the ship, but due more to the minor consideration given to the matter. The mere drilling of a few holes in the overhead deck beams would often prove of service in overhauling auxiliaries and their connections, lifting cylinder covers and drawing pistons, rods and pumps. It is a simple matter to drill a few one-inch holes at the shipyard, which the absence of tools at sea renders difficult or tedious. The same remark applies to much of the gear about the engine, and a tapped hole here and there for an eye-bolt would often mean a saving in time, as well as preserving the slings that are cut or stranded in being twisted round pump rods, air pump valve covers, cross-head keeps and similar articles.

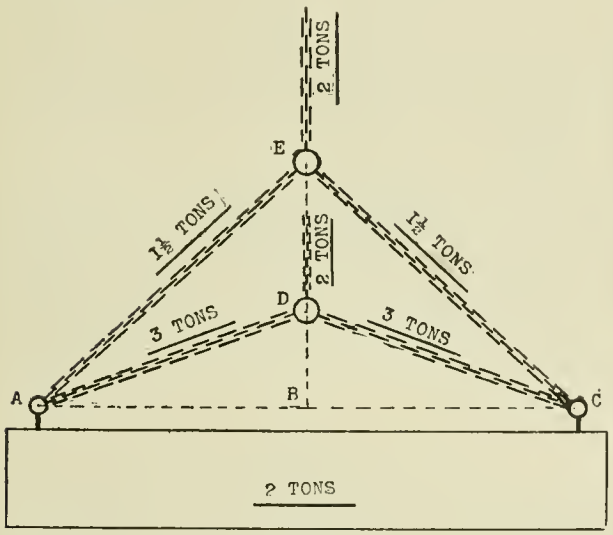
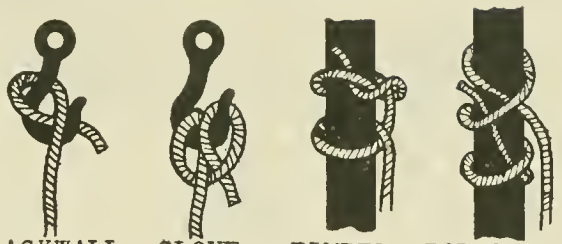


Diagram A.

Chain blocks vary in quality more than in price, and may easily come within the danger zone if subjected to rough usage. The rim section of the chain wheel is in many cases too weak, with the result that a piece is often broken away and the chain is jerked off the wheel. This is an unnecessary evil, as the weight of the gear is scarcely affected by a stronger section and cast iron is not expensive. The blocks for bottom end bearings should have a sufficiently long lifting chain, and small hooks, to allow of lowering the bearing down on to the tank top without changing slings; failing this a set of wire ropes may be used, the ends being formed with a looped splice and served. A moderately heavy hook or eye-piece should be incorporated in the splice, to prevent the wire being weakened in bending over varying sizes of hooks or in forming short slings by doubling one end through the loop at the other. The fine wire, fine pitch type of rope is most flexible, but for this purpose is not essential. Where tapped holes are drilled in the under side of the cross-head, or top end bolts, the usual length of chain supplied may be found sufficient, but, valuable as they are, these are too often absent.

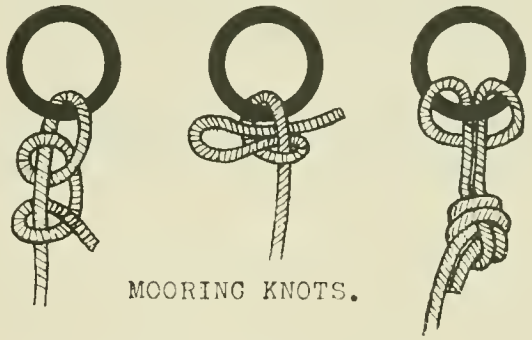
For heavy lifts a screw gear is frequently fitted, operated by means of a toggle bar fitting into holes in the screwed lifting spindle, a small handwheel is a useful adjunct for lowering and taking up slack. Occasionally the lifting beams at the cylinder tops do not give sufficient head room, thus requiring short slings which approach very near the danger angle and frequently cause the eye bolts to bend. It may be useful to notice the effect of using short slings in this manner, and the diagram A illustrates two instances in which he stress on the sling is in one case double that in the other,



the stress varying directly in the ratio of $\frac{AD}{2}$: DB, the stress in the sling AD is 3 tons and in the sling AE, 1½ tons, with a load of 2 tons on the gear.

Where chains are in constant use it is customary to test and anneal them once a year; for engine-room purposes, with chains in periodical use, this time can easily be extended to five or ten years, but wire and fibre ropes should be examined or tested more frequently, especially where fraying or stranding is likely to be caused by knots, ill-usage, dampness or the tendency a rope has to internal abrasion.

There is a prejudice in some quarters against chain blocks, or rather perhaps a preference for rope blocks; small rope blocks are much handier than even the best of chain blocks, but for heavy lifts the number of men required is a disadvantage, unless a hand winch is available. One advantage the rope block has, however, in its being less liable to be overloaded, the stress on the rope is more easily felt than is the case with the differential chain type, particularly where the load is not a simple lift.



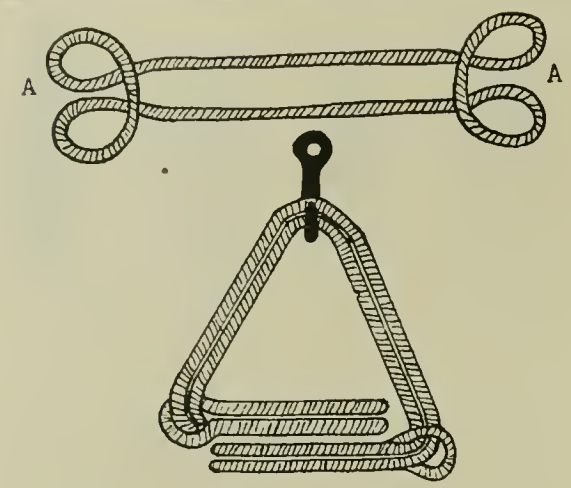
MOORING KNOTS.

It is customary to measure rope by the circumference, but for gauging the strength of slings the diameter is a more convenient dimension, and the following table will be found a ready means of estimating the strength of lifting tackle, where D is the diameter of the rope, chain link or eye bolt in inches.

Hemp rope	$\frac{1}{2}D^2$	tons safe load.
Eye bolts	$2D^2$	,,
Wire rope	$4D^2$	,,
Iron chain	$6D^2$	,,
Steel chain	$8D^2$	,,

These are safe working stresses for lifting purposes, but it is advisable to keep in view the fact that the strength of a rope is reduced 20 per cent. by a splice and 30 per cent. by a knot, and damp hemp ropes, rusty wire ropes, knotted chains and eye bolts screwed into soft metal should be allowed for.

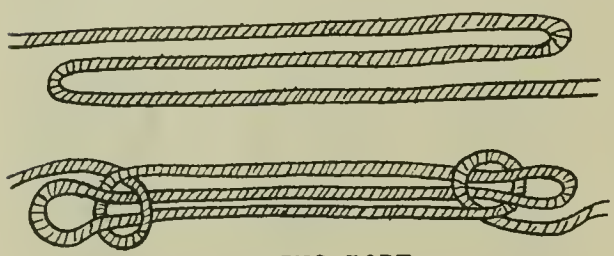
HAWSER BEND. REEF KNOT.



DOUBLE SLING.

For getting an approximate weight of lift the following is readily carried in the memory.

Zinc	0·25	lbs. per cubic inch.
Cast iron	0·26	,, ,,
Tin	0·27	,, ,,
Wrought iron	0·28	,, ,,
Steel	0·29	,, ,,
Brass	0·30	,, ,,
Gunmetal	0·31	,, ,,
Copper	0·32	,, ,,

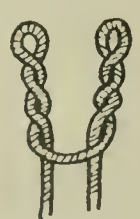


SHORTENING ROPE.

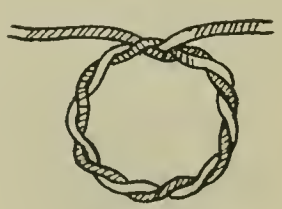
The lifting gear usually supplied for smokebox doors leaves much to be desired, may even require all hands to assist with rakes and slices. The chains may be too large or the wheels too small, oil holes can be dispensed with—the lubrication being dust or small coal, and when the wheels are out of line with the shackle on the door a wire rope is better than a chain. The gear for lifting bunker doors is also sometimes capable of improvement, sometimes it does not exist.

Hydraulic jacks are seldom in use, but, when an emergency arises, the time spent in giving them a periodical examination ensures their being in good working order. The screw jack is more often employed and if the swivel top is kept in good order is a handy tool; usually it is marked with the safe load it should carry, and the height of lift may be usefully added.

The knots and hitches used " in sail " are not all available in the engine-room, a knot may be safe under a steady load which cannot be made use of where the rope may jump slack, but while a large number are of service the comparatively rare intervals at which they are made use of is generally the reason for their not being more familiar. With slings and hooks more in daily use the art of tying knots becomes neglected, unless some means are adopted for keeping them in mind, and the few here given may serve as memoranda.



CATSPAW SHORTENING.



GROMMET.

The blackwall hitch is useful when a sling is not available and the coil of the rope block is made to serve; the clove hitch is, however, more secure. For attaching a rope to a pillar or stanchion the timber and rolling hitches are easily made, and may be also used for lowering tubes and bars. For mooring purposes there are about two dozen well-known ties; three of these shown are, like the clove hitch, useful for lifting light parts on a shackle or eye-bolt. The hawser bend shown, sometimes called the craddock bend, is a stronger form of the reef knot, either of which is useful for joining two ropes, and more readily cast loose than the common granny knot. Two running knots make a good fastening where the ropes are of different sizes. A handy form in doubling a sling for lifting rods vertically is shown, the two loops being picked up at A and passed over the rod, keeping the bights on opposite sides.

A convenient shortening for a rope or sling is shown in two positions, which may be secured against slipping by passing the loose ends through the loops. The catspaw shortening is sometimes used for short lengths, but the rope is often stranded in consequence of the rough usage, and a clove hitch is better for a few inches. The grommet is not strictly a lifting knot, its use being more confined to acting as a joint washer; the ring may be formed as a simple hitch or as a running knot, and either will draw tight on the bolt being jointed.

These few notes comprise but a few of the varied appliances used in the engine-room and so much has lifting gear improved of late that some little attention may well be bestowed on its selection. The introduction of ball bearings, self-oiling gear, safety devices and gravity lowering has raised the efficiency of chain blocks and runway carriages, frictionless screw jacks and hydraulic forcing jacks have been usefully improved, and a small outlay on conveniences for lifting purposes may easily effect a considerable reduction of time and labour.

GEORGE WESTINGHOUSE.

It is with much regret that we have to record the death of Mr. George Westinghouse, which occurred at New York last month after suffering for some time from an affection of the heart. It is generally recognised that George Westinghouse was a man with some remarkable characteristics, for in addition to being an extremely versatile inventor, his power of dealing with figures, particularly from the financial aspect, enabled him to turn his inventions to great profit to himself and those associated with him. Born in the year 1846 in the State of New York, he was in his sixty-eighth year at the time of his death. Although much of George Westinghouse's life's work had to do with engineering not allied to the marine engine or to ships, there was one connection in which his ingenuity was brought into play with regard to ship propulsion. In an endeavour made to improve the efficiency of steam turbines for ships' propulsion George Westinghouse was associated with Rear-Admiral George W. Melville, ex-chief engineer of the United States Navy, and Mr. John N. Macalpine in the introduction of speed-reducing gear between the turbine and the propeller shaft. It was some four years ago that at the instigation of George Westinghouse the two gentlemen in question undertook to thoroughly investigate the possibility of the steam turbine for ship propulsion and its chances of wide adoption in comparison with those of the best designed reciprocating engines, and our readers will remember that we described and illustrated fully the result of that investigation in dealing with the Melville-Macalpine helical-tooth reduction gear for which a transmission efficiency of over 98 per cent. was claimed, a large portion of the credit for which must be assigned to the Westinghouse Company who manufactured the machinery in question.

After a strenuous and successful career in every sense George Westinghouse leaves a name which will last as a landmark in engineering.

THE LONGITUDINAL STRENGTH OF A VESSEL.

THE strength of a vessel is a fascinating and all-important subject to the naval architect, and this strength is, of course, most called for when the vessel is among waves, although a certain amount is required even when the vessel is lying at rest in still water.

Still Water Condition.

When in still water the unequal distribution of weight and buoyancy, or lifting force of the water, causes certain portions of the vessel to have a tendency to sink, while others seek to rise. This will be readily seen if we assume the vessel to be composed of, say, five watertight sections, as in Fig. 1, which are free to move vertically. The aftermost portion, which ends at the after-peak bulkhead, displaces very little water and yet is of great weight, due to the inclusion of the stern frame, the counter and its framework, etc.; as, then, the lifting force of the water is not able to support the weight of this part, the section will sink until its displacement equals its weight. This sinkage is indicated by the original waterline, shown dotted, being below the new waterline. The next section comprises the holds abaft the machinery space, and here we have considerable buoyancy, due to the full form of the vessel, which buoyancy may well be greater than the combined weight of hull and cargo in that section, causing it to rise bodily. Briefly considered, the weight of the machinery section will be in excess of the buoyancy, causing sinkage; the holds in front of this may be about the same weight as the

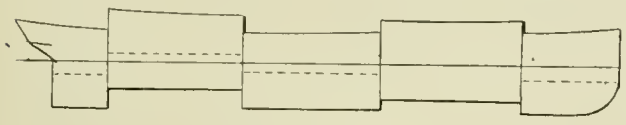


FIG. 1

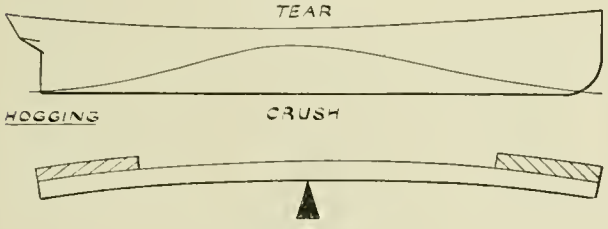


FIG 2

displaced water, leaving the waterline unchanged; the excess of the weight over the buoyancy of the part forward of the fore-peak bulkhead will cause that section to sink. This tendency of the parts to slide past one another calls for considerable strength of shell riveting and for strong longitudinal parts.

Hogging Condition.

When considering the strength of a vessel among waves, it is customary to take first the vessel as being poised on the crest of a wave of her own length. This is called the "hogging" condition (Fig. 2) and tends to tear the upper and crush the lower portion of the vessel, due to the dropping of the unsupported ends of the vessel. In order that the strength of the vessel may be sufficient to meet the worst condition which obtains in practice, we take the possible condition when, the end holds only being full of cargo and the bunkers being burnt out, the peaks have to be filled. This results in the vessel being practically a beam (Fig. 2.) supported at the centre and loaded at the ends.

Sagging Condition.

The last condition that has to be considered is that of "sagging" when the vessel is in the hollow of a wave (Fig. 3) of her own length, which holds up the ends, and leaves the centre practically without support. To get the worst sagging condition we must assume a time when the bunkers and centre holds are full and the end holds and peak tanks are empty. We will then have the vessel in the condition of a beam (Fig. 3) supported at its ends and loaded at its centre.

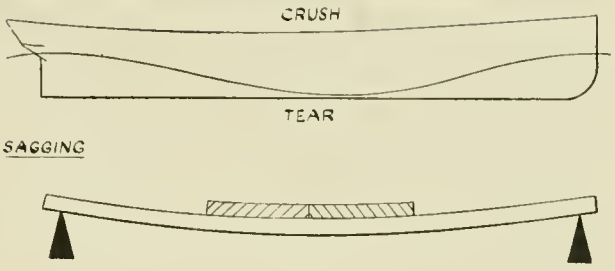


FIG 3.

Standard Wave.

It will be noticed that both for hogging and sagging the wave assumed is one of the same length as the vessel, the reason being that that length of wave gives the worst possible condition. Shorter waves would support the vessel at more points than those shown in the figures, while waves of length greater than that of the vessel would approximate more to the still water condition, when the vessel is supported along her entire length.

The height of the standard wave is one-twentieth of its length for deep sea waves, and one-fortieth of its length for those in shallow water. These proportions of length to height of wave are arrived at by analysis of numerous observations taken at different parts of the world.

Effect of Variation in Pressure in Wave.

If the motion of a cork be observed as it moves under the action of the after-swell of a storm, when the wind has entirely died away, it will be seen that the cork travels, practically, in a vertical line and does not proceed in the direction in which the waves are moving. This shows that, while the wave formation travels along like a billow in a long strip of carpet, one end of which is shaken, the body of water does not move longitudinally. If now we consider that at sea, as we go lower and lower in the water, we will come at length to water which is quite undisturbed by the passing of the waves, we see that there is a level then, above which we have a constant mass of water which is being alternatively expanded and contracted in the vertical direction. If we now consider the hogging condition, when the vessel is taken as being poised on the crest of the wave, we can picture her as supported by three identical cushions, the centre one being well shaken

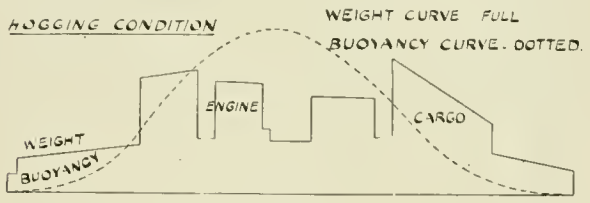


FIG 4

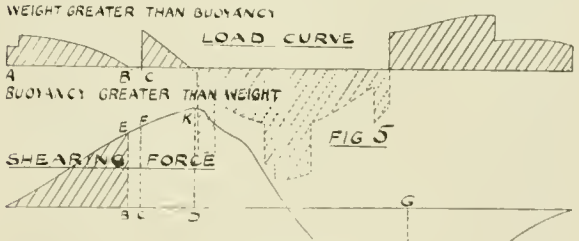


FIG 5

FIG 6

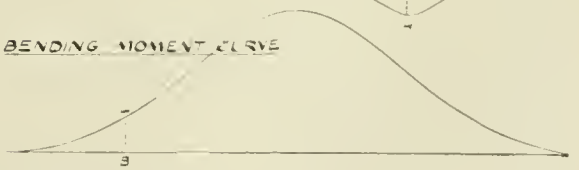


FIG 7

up, and the end ones pounded as flat as possible. The result is that she sinks deeply into the centre "cushion," so that instead of supporting her practically at one point, which would be the case were the variation in wave pressure not taken into account, the support is spread along a considerable portion of her length. Again, the compact "cushions" at the ends of the vessel give those parts more support than would water unaffected by this variation of pressure. To sum up: in the hogging condition we get the support offered by the wave better distributed along her length when the variation in wave pressures are taken into account than when these are neglected. Reasoning along the same lines, we arrive at a similar conclusion for the sagging condition.

When going into the strength calculations of a vessel, it is necessary to treat both the hogging and the sagging condition, as sometimes one, sometimes the other condition gives rise to the greatest stress in the material of which the vessel is composed.

Weight Curve.

The first thing that must be got out when the strength calculation is entered upon, is the weight curve (Fig. 4.), which shows the disposition of the weight throughout the length of the vessel.

It is interesting to note the position and relative importance of the weight items—such as machinery, coal, etc.—which stand out as prominences on the weight of hull, which would itself be bounded by a sweetly-flowing curve devoid of lumps. In Fig. 4, the hogging condition has been taken, and, in order to make the condition as severe as possible for the vessel, the ends are heavily laden, while the central portion is light. The total area of the weight curve must represent to same scale, the total weight of the ship.

Buoyancy Curve.

Next comes the buoyancy curve, which, for the hogging condition, takes the form shown dotted in Fig. 4. The area of this curve must equal that of the weight curve, as they are both equal to the weight of the vessel. Another condition must be fulfilled by the buoyancy curve, and that is that its centre of area must be in the same vertical as that of the weight curve. If this is not the case, then we would have two equal, opposite, parallel forces, acting at some distance apart, and these would constitute a couple trimming the vessel by the bow or the stern, as the case may be.

Load Curve.

Wherever the weight is greater than the buoyancy there we have a load acting on the vessel as a whole, and where the buoyancy is greater than the weight we have a lifting force which may be treated as a negative load, giving us a load curve as shown in Fig. 5. This, as will be readily seen, is the line of the weight curve which wavers now above and now below the dotted line of Fig. 4, the dotted line being the base which is straightened out in Fig. 5.

Shearing Force Curve.

To get the shearing force at any section of a vessel, that is to ascertain the force which is tending to make the part of the vessel to the left of that section move vertically relatively to that to the right of it, and so cut or shear her at the section, we must add all the vertical forces to one side of the section; say, to the left side.

At the section B of the ship the shearing force BE (Fig. 6) is equal to the load to the left of that section; this load is the area from A to B of Fig. 5. At section C the shearing force CF is equal to the load to the left of that section, or is equal to the area between A and B (Fig. 5), *less* the area between B and C. Proceeding in this way at intervals along the length of the vessel, we get the shearing force curve of Fig. 6.

Ordinates or shearing forces above the base indicate that, at the section for which the ordinate represents the shearing force, the part of the vessel to the left of that section tends to be moved down by this force relatively to the remaining portion of the vessel. Ordinates or shearing forces below the base indicate that the left portion tends to move up. Positive and negative shearing forces are equally severe on the vessel, so that we give the same importance to the maximum negative shearing force GH as we do to the maximum positive shearing force DK. These forces usually occur at about one-fourth length from either end of the vessel, and as in long vessels the riveting is liable to show weakness there, it is required that in those regions the edges of the shell plating should be treble riveted, instead of double, as elsewhere.

Bending Moment Curve.

The last curve that must be drawn is the curve whose ordinate at any section gives the bending moment at that point, or the tendency of the loads to the left, say, of the section to produce bending there. The ordinate of this curve (Fig. 7) at any section is got most simply by finding the area of the shearing force curve to the left of that section; for instance, the bending moment BL (Fig. 7) at the section B is proportional to the shaded area (Fig. 6) to the left of B. It will be noticed that so long as the area of the shearing force curve is positive, so long will we be adding to the ordinate of the bending moment curve. When, however, the area of the shearing force curve becomes negative, we must deduct from the bending moment ordinate. The point, then, where the shearing force commenced to be deducted, that is, the point where it crosses the base, coincides with the section at which the bending moment has its maximum value.

(To be concluded.)

LIQUID FUEL.

At the Institute of Marine Engineers on Monday, March 9th, a paper was read by Mr. J. Veitch Wilson on "Liquid Fuel," the Hon. Secretary, Mr. James Adamson, presiding.

Mr. Veitch Wilson, in the course of an interesting historical retrospect, including a personal experience of over fifty years, said it seemed reasonable to suppose, in view of the fact that so much petroleum had been found by spontaneous exudations and accidental discoveries, that the world was saturated with oil, and that, by systematic investigations, supplies were likely to be discovered in every habitable quarter of the globe. The world's production of crude petroleum showed a steady advance each year from 264,249,119 barrels in 1907 to 351,178,236 barrels in 191–, and he understood that the figures for 1913 showed an advance of 10 per cent. over those of 1912. After dealing with the origin and constituents of petroleum and describing early and recent devices for its utilization as fuel, the author expressed the opinion that the full benefit in the use of oil was not to be derived from its substitution for coal for steam raising purposes, but from the general adoption of the internal combustion engine instead of the steam engine.

Paraffin, which was practically free from oxygen, gave 20,251 heat units; while alcohol, which contained a high percentage of hydrogen, gave 12,593 units, and olive oil 17,482 units. But while it was apparent from these figures that the presence of oxygen reduced the calorific value of oils as fuels, it must be equally recognised that its presence promotes combustion and reduces the tendency to smoke with production of soot or carbon. Many vegetable and some animal oils might be burned in open lamps without smoke, while it is impossible to burn paraffin or petroleum under such conditions on account of the dense volumes of smoke they give off. He thought, therefore, he was justified in saying that those engineers are in error who object to the use of vegetable oils, pure or mixed with mineral oil, as lubricants for internal combustion engines for fear of the carbonaceous deposits which, they say, these oils are liable to produce. The author then described the various products obtained from petroleum suitable for different types of engines, and specially called attention to the ambiguous use of the expression "crude oil," which might denote either oil containing all its dangerous fractions or oil from which these have been removed by distillation. The paper concluded with tables showing fuel values, thermal and commercial.

In opening the discussion which followed, Mr. F. M. Timpson said it was peculiar, in view of Mr. Veitch Wilson's remarks, that more mineral oil than vegetable oil was used for internal combustion engine purposes. The mineral oils were found to be very satisfactory both for light and heavy engines. Mr. J. C. Williams considered that the question of suitability largely depended upon the manner in which the oil was introduced. The lubricating oil was put in as a lubricant, and therefore did not burn so quickly, with the result that it carbonized. Any oil introduced under those conditions would give the same result. Mr. J. Clark said the proper mixture of the air supply had a great effect upon the production of smoke, and many oil fuels produced smoke

if this was not carefully watched. Mr. F. O. Beckett said the introduction of the internal combustion engine opened up a problem for metallurgists to make a metal which would withstand the exceptional heat. Mr. Duncan Barr referred to methods of disposing of the tarry residue of a gas-producer plant. Mr. J. Shanks said he understood it was not possible in Diesel engines to introduce the lubricating oil with the fuel oil. The improvements effected in the steam engine in recent years had made it impossible for the internal combustion engine to gain a footing on the ground of economy, but when oil became cheaper in price marine engineers were prepared to take charge of the internal combustion engine and run it as successfully as they did the steam engine.

In replying, Mr. Veitch Wilson said his experiments had proved that fatty oils were not responsible for deposits in the engine. Troubles with deposits or gumming in gas engines were generally overcome by the use of a vegetable oil, and this course was invariably adopted and recommended by the late Sir William Crossley and other well-known makers of gas engines. With regard to the late Dr. Diesel's recommendations of mineral oil for the Diesel engine, this seemed inconsistent in view of his recommendation of his engine because it could use pure vegetable oils.

A vote of thanks was accorded to Mr. Veitch Wilson on the proposal of Mr. George Adams, seconded by Mr. J. Clark.

A NEW LOCK NUT.

THE number of lock nuts that have been invented and recorded in the history of mechanics is legion and one is always interested in the product of an inventor who manages to devise something which has not previously been called into existence. Many lock nuts have, owing to their particular construction or want of adaptability to every-day practical conditions, to be relegated to the domain of fads, and a very small number indeed of practical devices have met with substantial commercial success. It is our pleasure to illustrate and describe a new lock nut under the title of "Vislok," which is being placed on the market by Vislok Ltd., of 3, St. Bride's House, Salisbury Square, London.

Figure 1 of the adjoining diagrams illustrates the lock nut by itself, ready for screwing on to a bolt.

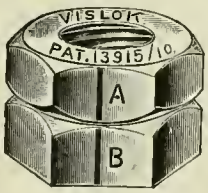


Fig. 1.

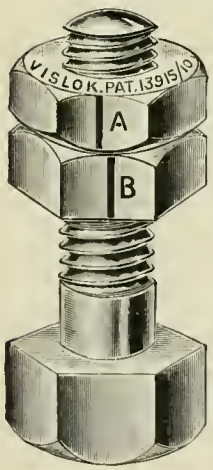


Fig. 2.

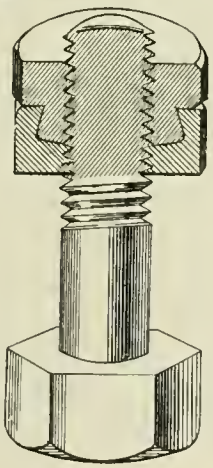


Fig. 3.

Figure 2 shows the lock nut on a bolt, the parts being disposed so as to produce a locking effect, and figure 3 is a sectional view of the lock nut on a bolt showing the form of association between the two parts of the nut, the relative movement of which produces the locking effect. It may be pointed out that these nuts are made as to pitch and diameter of flat and width across the flats to conform to the ordinary recognised standard conditions, while the standard depth is only 50 per cent. greater than that of an ordinary nut. It is also made the same depth and 25% less than the ordinary nut for confined spaces and is equally effective. By reference to figure 3 it will be seen that the nut is formed in two parts, the upper portion having a circular collar of dove-tail formation and the lower part being formed with a recess adapted to contain the dove-tail portion of the upper part. The closing in of the lower part on the upper part is effected by hydraulic pressure. Now, if the two parts so associated are tapped, you have two nuts engaged together in such a way that one can rotate relative to the other. Referring to figure 1, when the lines A and B are opposite to one another in a straight line, the nut is really a single one and is worked as such, the flats of the hexagon then being in the same plane, so that a spanner used on the two nuts engages both. After the nut has been screwed into position in this way, in order to effect the locking, the top part A is given a slight extra rotation, so as to set up a locking effect. In doing this, the line A is put out of alignment with the line B. When it is desired to remove the locking effect the spanner is utilized on the part A only, which part is revolved in a backward direction until the lines A and B coincide, when the two parts are operated together by the spanner and removed in a similar way to that utilized in screwing it on to the bolt. Its great feature lies in a circumferential grip which takes place on the top section being screwed towards the lower section, causing an inward expansion of the spigot in the undercut recess. The nut is not affected by heat, dirt or wet, and is absolutely air tight. The owners guarantee it to be immovable under any condition, neither slackening back nor tightening of its own accord, it cannot bruise the head of the nut or bolt, its life is as long as that of an ordinary nut, and furthermore it may be removed by an ordinary spanner. There are many applications in which this new lock nut can be utilized, and the obvious merits of the device should lead to a large sale among those who require lock nuts in any sort of work or position.

Toope's Asbestos Covering Company, Limited. This company, whose office and works are at Stepney Square, Stepney, London, E., have issued a new catalogue setting out particulars of the asbestos, felt and plastic non-conducting coverings manufactured and sold by them for hot and cold surfaces. In dealing with the merits of their particular product the results of some interesting experiments are given, from which it is clearly shown that over 80 per cent. of the heat which would pass away through the bare pipe is saved by their non-conducting coverings. Quite a number of forms of construction and different classes of material are set out in the catalogue, with comprehensive illustrations to indicate the special features in each case. Special note may be made of the various forms of heat-insulating materials in which cork forms the essential factor, among which may be mentioned "Corfelt," which is a covering consisting of a layer of cork insulation and a layer of blue felt sponge externally. It is claimed that this is the only insulation of its kind yet placed upon the market.

TURBINE *VERSUS* RECIPROCATING ENGINES FOR MARINE PROPULSION.

THE advent of the steam turbine as applied to marine propulsion at once raises the question as to its advantages and disadvantages, compared to the marine reciprocating engine, and before contrasting the two types, from an economical point of view, the merits and demerits of each type will be discussed. The approximate horse power of the world's shipping is twenty-eight millions, of which power twelve millions is now produced by steam turbines, and it is certain that in the near future the latter figure will be very materially increased. Greater knowledge as regards the economical combination of the impulse and re-action turbine, and also the combined reciprocating and turbine plant for marine purposes, will greatly tend to the production of an economical and reliable marine engine. Geared turbines are now extensively employed for slow-speed ships. In this case the high velocity of the turbine is geared down and the shaft speed of rotation reduced to moderate limits. For obvious reasons it is not considered that this arrangement will be fitted in warships or mercantile vessels of any size. With reduction gearings three distinct methods are employed—(*a*) hydraulic, (*b*) mechanical, (*c*) electric. The efficiency of the three systems is approximately as follows:—

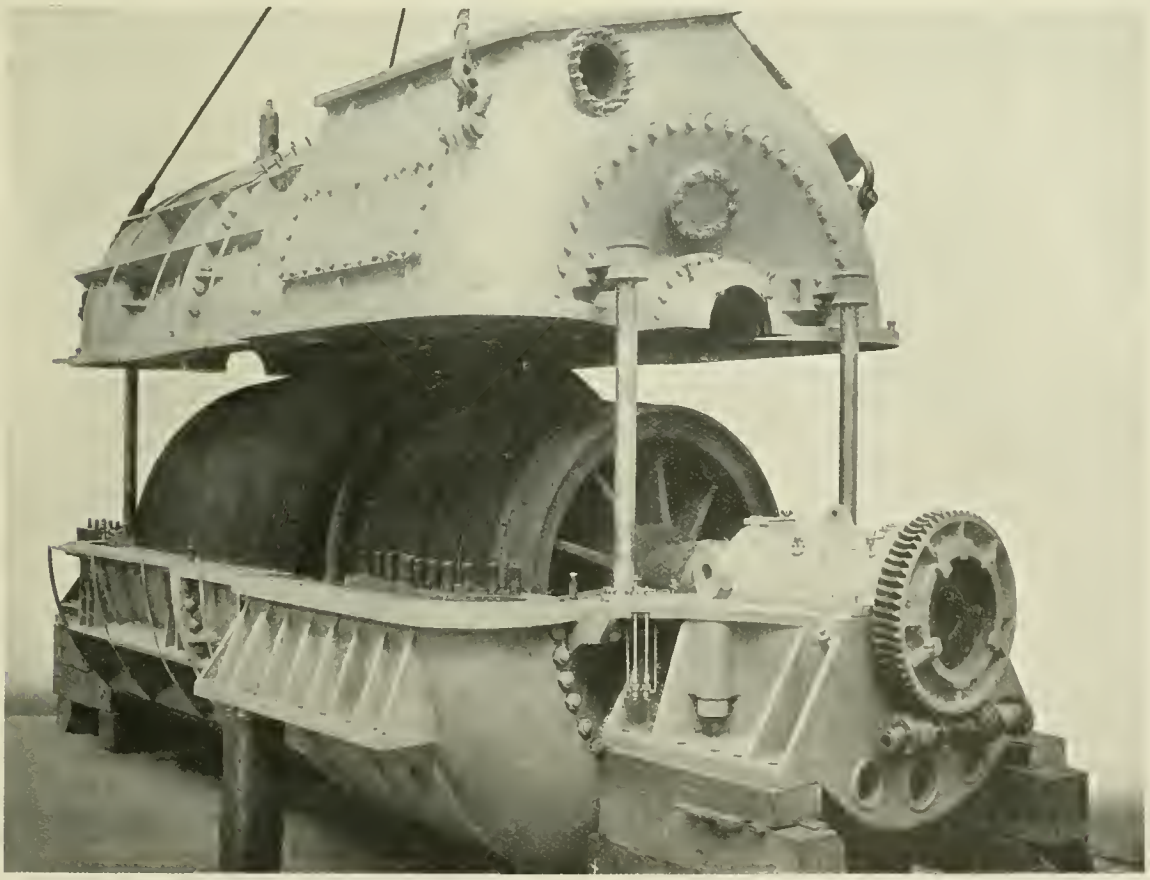
(*a*) 85 to 95 per cent., depending on size.
(*b*) 98 per cent. at full power.
(*c*) 90 per cent.

Of the above systems the mechanical gearing has proved its superiority, and ere long will doubtless be installed in a large number of fleet auxiliaries and merchant vessels of moderate speed. The principal types of turbines in use are the Parsons, Curtis, Zoelly and Rateau, the types mostly favoured for naval and marine purposes being the Parsons and Curtis. Data obtained from various experimental trials seem to prove that the ultimate steam engine for marine purposes will be either a combined Parsons and Curtis turbine or the combined turbine and reciprocator, and the experiments now being carried out will be watched with keen interest by all naval and marine engineers.

Advantages and Disadvantages of the Marine Turbine.—Probably the greatest advantage of the marine turbine is its extreme simplicity and the small number of working parts. This advantage, from a naval and marine point of view, is all important, as the fewer the working parts the less labour and time is required for adjustments and examinations. When it is considered that such working parts as slide valves, pistons, piston rods, etc., etc., with all the necessary gear in connection, are dispensed with, one great advantage of the turbine is at once apparent. In both the Royal Navy and Mercantile Marine the engineering staff is very materially reduced, and thus a material saving in wages and *personnel* is effected. This reduction in *personnel*, from a naval point of view, is a most important asset, as the fewer the men required below for the propelling machinery, the greater number of men are available for working the guns, etc. In the marine turbine the steam is applied direct from the boilers, but in the reciprocator there are great losses, owing to the steam doing so much work before directly actuating the mechanism. With the turbine there is no intervening loss, and it consequently follows that a higher efficiency is obtained, and it has been conclusively proved that with a high-power turbine the steam consumption is better than with the best reciprocator. The fact of this economy and higher mechanical efficiency over the reciprocator of equal power may be explained as follows.

From the nature of their construction large steam turbines are able to take full advantage of the whole expansive energy contained in the steam, even expanding to the very attenuated vapour densities produced by the best condensers. It is an easy matter to construct the low-pressure end of the turbine to effectively deal with this vapour, but the reciprocating engine from its nature can only take advantage of approximately two-thirds of the whole range of expansion, and is thus unable to deal usefully with the low vapour densities. Again, the reciprocator low-pressure cylinders, owing to structural difficulties, cannot be made large enough, and the last part of the expansion must run to waste. With the turbine, owing to the small number of working parts, the danger of breakdown is greatly lessened, and this makes the turbine almost ideal when fitted in warships or fast mail steamers. In the case of the reciprocator a hot bearing or piston rod might easily put one or both sets of engines out of action, rendering the ship practically useless until the defect has been made good. Even a minute amount of dirt finding its way through the lubricating pipes to the various bearings might cause them to warm up, and thus it will be seen how all important, simplicity of the engine arrangement of our ships, really is. By the nature of their construction turbines may be placed very low down in the vessel, although the area occupied is practically the same as that of the reciprocator. In warships this would be a big asset in action, the machinery being so much less liable to injury by gun fire. A most important consideration with a reciprocating engine is the cost of the lubricating oil, which is, with this type, from 7 to 10 per cent. of that of the coal. With a marine turbine the cost is only from $\frac{1}{2}$ to 2 per cent. of that of the coal, and when the cost of such oil is taken into account the advantage of the turbine in this respect is apparent. In connection with this point the amount of oil to be stowed and carried is materially lessened, and as oil is both heavy and bulky, the added advantage, especially for war vessels is still further demonstrated. As no cylinder lubrication is needed, as is the case with the reciprocator, the exhaust is clear and free from oil, and can be returned direct from the hot well to the boilers. This clean exhaust ensures clean feed water, and also obviates the chance of oil finding its way to the interior of the boilers, which fact in the past has been one of the most prolific causes of boiler breakdown. When it is considered that upon the efficiency of the boilers the efficiency of the ship from a steaming point materially depends, the importance of any means whereby this efficiency can be increased must be carefully considered. A great point in the marine turbine's favour is the absence of vibration, this being practically non-existent, even at the highest speeds. From a naval point of view this absence of vibration is of particular value, more from the gunnery and

torpedo aspects of the case. With a warship fitted with reciprocating machinery the vibration in the control station is excessive at high speeds, thus rendering accurate shooting difficult. Sensitive wireless work is almost an impossible task where there is excessive vibration. Marine steam turbines have even turning movements and good parallel running, the governing being superior to that of any reciprocating engine, these two factors being most important from both the naval and marine engineer's point of view. Boiler priming—that is, the water being carried over with the steam to the engines—is liable to cause great damage with reciprocating engines, and in addition excessive strains are put on the rods, etc.; also leakage at the pistons and slide rod glands is induced, thus decreasing the efficiency of the whole installation. No means have yet been devised to positively prevent priming; the only method which can be adopted is to ease down the engines and slightly close the boiler stop valves. Many cases have occurred in which the cylinder covers have been knocked off or fractured owing to priming, but with the turbine the only effect is slightly decreased speed. For a turbine-driven torpedo boat destroyer or torpedo boat this is a valuable asset. As regards overloading, this may be indulged in to a reasonable extent with marine turbines without harmful results. Spare gear—an important factor in all vessels—must be carried, such gear requiring careful stowage. For reciprocating main engines this gear is heavy and cumbersome to a degree, and requires to be kept at all times in first-class condition. The absence of such main engine spare gear in a turbine-driven ship materially increases the engine-room space. As before-mentioned, the number of the engine-room attendants is considerably less in a turbine ship, and it must be noted here that with a reciprocating engine the number of men must be increased the higher the speed. A considerable saving in wages is effected in the engine-room staff, and this should recommend the turbine from the merchant service point of view. As regards the comfort of the engine-room staff with the two types of engines, no comparison can be made, and this is especially noticeable in small craft, such as torpedo boats and destroyers. In such vessels fitted with reciprocators, the men below have a most unpleasant task, and in rough weather there is a large element of danger. This, of course, in the turbine-driven boats, does not obtain. It must be remembered also that the hull strains of such frail craft are greatly increased when running at high power with reciprocators, and the advent of the marine turbine has done much to decrease this drawback. So far the advantage of the marine turbine over the reciprocator has been dealt with, and now the other side of the question will be discussed. The initial cost of the turbine is greater, but this is compensated for to a certain extent by the reduction in running repairs. With the turbine, should a breakdown occur, complete disablement of the particular turbine effected would take place. Should only one section of blading,



Parsons' Combined Low-Pressure and Astern Turbine with cover raised.

or even a few blades, become detached from the rotor or casing, it is probable that the action set up would quickly grind away the remaining blades, putting the particular turbine out of action. In the earlier turbines, trouble was experienced by allowing insufficient tip clearance, and so causing contact after the turbine was warmed up. Whipping of rotors was also a source of trouble, but by careful arrangement of tip clearances this defect has been eliminated. Re-blading is a very long and costly repair, the larger turbines taking many weeks to re-blade. At low powers the turbine is much more uneconomical both in steam and water consumption than the reciprocator. It is interesting to note that in the large ocean liners fitted with turbines, and when steaming at 25 knots, the steam consumption is approximately 13 lbs. per I.H.P. per hour, but at 16 knots the consumption is approximately 21 lbs. per hour. On the other hand, with the reciprocating engines this increase does not take place at the lower powers. In the latest type cruisers fitted with reciprocating engines steaming at 23 knots, the steam consumption is 20 lbs. per I.H.P. per hour, but at 15 knots it is approximately only 17 lbs. It will thus be seen that the turbine drops in efficiency as the load is decreased, but the efficiency of the reciprocator rises under like conditions. With turbines it is of the utmost importance that the warming up should be done very slowly and equally. One part must be warmed up in relation to the other, owing to the very fine clearances that exist between dummy rings and dummy grooves in the first place, and between blades and casings of rotors and turbine covers in the second. If this is not carefully done contact will take place with the former and possibly with the latter owing to warping, and this might cause the blades to strip. All steam connections to the glands must be most carefully used, in order to make sure of the expansion of the rotor spindles where passing through ends of turbine casings and thus keep dummy clearances at required settings. All turbine drains must be kept open to stop accumulation of water inside, and so do away with unequal expansions and temperatures.

Cavitation.—This may be defined as the formation of a space or cavity at the back of the propeller blades. It is caused by the atmospheric pressure not being able to press the water up to the back of the blades fast enough to allow of efficient thrust, and usually occurs when the propellers are revolving at high speed, as in the case of a turbine. It might be stated that cavitation is the result of trying to get too much work out of each square foot of blade area. As will be readily understood cavitation causes reduced propeller efficiency, as it reduces the propeller slip. In turbine propellers the blades are much broader in proportion to their length than is the case with the ordinary reciprocating engine propeller. This somewhat peculiar shape is due to the diameter of the propeller being necessarily much less than the reciprocating engine propeller, owing to the limited space aft, and in order to obtain the required blade area a much larger ratio of blade surface and disc surface is necessary. With all turbine propellers cavitation takes place to a more or less marked degree, thus causing a loss in efficiency.

Comparative Trials.—From the results of the trial, as shown by the following table, it will be seen that there is a gain of 15 per cent. in coal consumption in favour of the geared turbine. In both ships the boilers were identical and the same steam pressure was maintained, *viz.*, 180 lbs. The *Cairngowan* is fitted with single triple-expansion inverted direct-acting engines, with cylinders of 24", 40" and 66" dias., the stroke being 45", and is engined by Messrs. Wm. Doxford & Sons, Ltd. In the case of the *Cairnross* the machinery consists of one high-pressure, one low-pressure, high-speed turbine geared to single main shaft. Ratio 26·2. The propellers were identical, and the ships' bottoms were cleaned at the same time. The duration of trial was thirty-six hours under identical conditions.

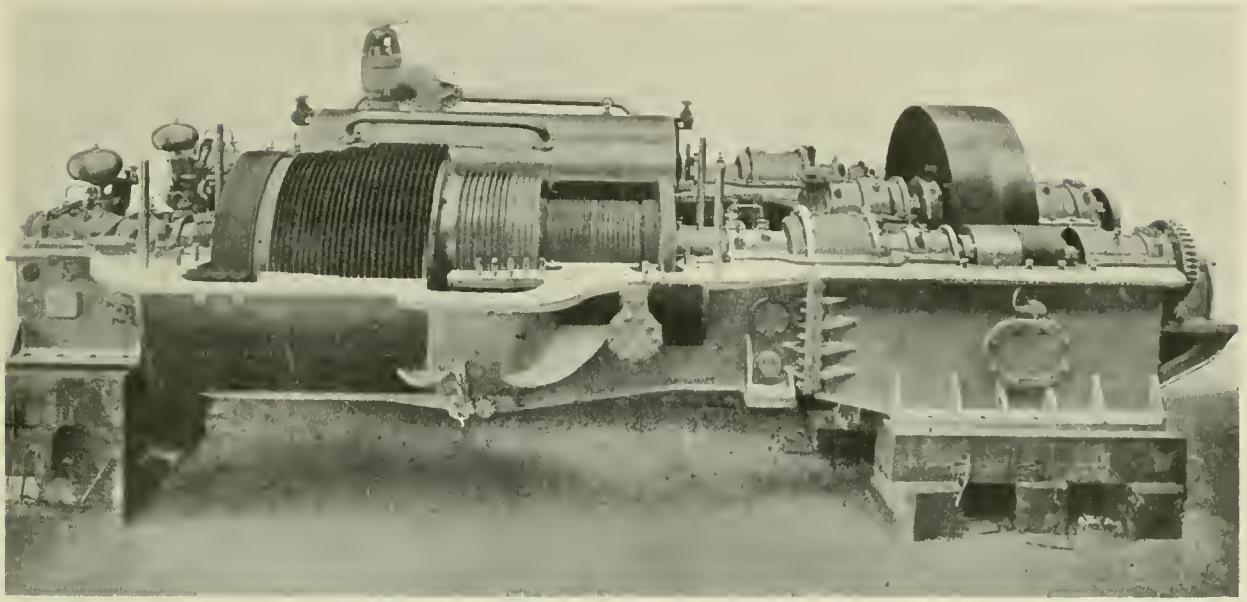
Report—36 Hours' Trial.

Particulars.	*Cairnross* Geared Turbine.	*Cairngowan* Triple Expansion.
Mean revs., per min.	61·76	61·68
Coal per day, tons	27·8	32·7
I.H.P.	—	1,790
S.H.P.	1,570	—
Ratio of S.H.P. *Cairnross* to I.H.P. *Cairngowan*	87·7%	—
Coal, lbs. per I.H.P., all purposes ..	(equiv.) 1·45	1·704
,, ,, S.H.P., ,, ..	1·65	(equiv.) 1·94
Water consumption per hour, all purposes (estimated)	22,000 lbs.	27,200 lbs.
Water consumption, estimated per I.H.P. hour	(equiv.) 12·3 lbs.	15·18 lbs.
Water consumption, estimated per S.H.P. hour	(equiv.) 14 lbs.	(equiv.) 17·3 lbs.
Hot well temp,..	79°F.	104°F.
Feed-water temp.	203°F.	221°F.
Estimated lbs. of water per lb of coal	8·5	8·97
Percentage of ash	12·5	9·36
Pressure, engine room steampipe ..	158 lbs.	175 lbs.
Initial pres. H.P. Turbine	138 lbs.	—
Vacuum	28·75"	26·8"
Circulating water inlet	50°F.	50°F.
,, ,, outlet	70°F.	95°F.

Mr. Russell Cairns gives the calculated gain by adopting the geared turbine in the *S.S. Cairnross* taking the coal consumption with geared turbines at 27 tons per day, and with triple-expansion engines at 32 tons per day, as follows:—

On a round trip the total expenses of the geared turbine *Cairnross* amounted to £11,700, and freight earned £19,734, leaving a balance of profit of about £8,034 in 174 days. Seventy-three days would be spent at sea, and 101 in port. With triple-expansion engines, the *Cairnross* performing the same trip would have to bunker both at home and abroad. The estimated expenses would be £11,905, and gross freight £19,378, leaving a profit of £7,473 in 172 days. That left a balance in favour of the geared turbine of £561 for the 174 days, which worked out at £1,202 per annum under identical conditions. On a voyage from the United Kingdom to America in ballast and back with mixed cargo in the berth, the following results are calculated:—

Forty-four days would be occupied, of which thirty-two would be steaming days. With geared turbines the *Cairnross* would save 160 tons of bunker coal, which at the approximate rate of 15/- per ton was £120; and she would carry on the homeward voyage 80 tons more cargo than a similar ship with triple-expansion



Parsons' Geared Turbines showing a H.P. and a L.P. and Astern Turbine coupled to a common gear wheel, as fitted in the S.S. *Normannia* (L. & S. W. Ry. Co.)

engines, which together with the bunker coal saved would leave a nett gain of £170, or £1,460 per annum.

In the cargo ship *Vespasian*, a vessel of 275 ft. long and 4,350 tons displacement, the triple-expansion engines were removed, and turbines were substituted with 19·9 to 1 gear. Before, however, the new machinery was fitted the reciprocating engines were thoroughly overhauled, and trials run for comparative purposes. The turbines after being fitted were subjected to exactly similar trials, results showing a saving in coal of 20 per cent., and in the weight of engines 25 per cent., with corresponding increase in earning power. In the first channel steamers fitted with this type of engine, the saving in coal was approximately 40 per cent. as compared with vessels fitted with direct-driven turbines, this gain being principally due to the adoption of twin instead of triple screws and to the higher efficiency of the machinery. The steam consumption for the turbines was approximately 12 lb. per shaft-horse-power hour. It is considered that in the adoption of this type in liners now under construction the reduction in the weight of the machinery will be equal to 15 per cent., with material gain in space.

A most interesting series of trials have been carried out in America with three vessels fitted respectively with triple-expansion engines, propulsion by electric transmission, geared turbines. All three vessels are of similar design and are used as naval colliers. The following table gives particulars of these vessels and also the steam consumption.

General Summary.—It has been shown that the turbine is undoubtedly superior to the reciprocator as regards economy at high powers. Turbines are therefore installed in all warships where great speed is required. It is considered, however, that the ideal engines for high-speed warships will be the reciprocator and turbine combined. High-power warships usually cruise at the economical speed, which is comparatively slow, and if turbine-driven must sacrifice

Comparison of Alternative Systems of Machinery.
U.S. Navy Colliers. *Cyclops.* *Jupiter* and *Neptune.*

Particulars.	*Cyclops.* Two triple-expansion engines.	*Jupiter.* One turbo-generator and two motors.	*Neptune.* Two turbines, each with gearing.
Displacement, tons ..	20,000	20,000	20 000
I.H.P. at 14 knots	5,000	—	—
Engine or turbine speed at 14 knots	88 r p m.	2,000 r p.m.	1,250 r.p.m.
Revolutions at 14 knots per min.	88	110	135
Weight of propelling machinery	280 tons	156 tons	Not known
Steam consumption in 1 lb. per shaft horse-power hour	14 (estimated)	12 (tested)	Unknown
Makers of machinery..	—	General Electric Co., America	—

economy at the slow and moderate speeds. With the combination mentioned, however, the reciprocator would be utilised for slow and moderate speeds, the combination being brought into action when high speeds were required. In some small cruisers and torpedo boat destroyers combined impulse and reaction turbines have been fitted. In this case twin screws are fitted in lieu of triple, the usual method in this class of vessel. The turbines in this case consist of one or more velocity compounded impulse stages at the high-pressure end, with reaction blading for succeeding stages. Reverse turbines are arranged for, similarly. For fast ocean liners, which run at practically full speed for the whole voyage, the turbine is, of course, installed, and has proved its many advantages over the reciprocator for this class of vessel, the absence of vibration being a great factor in its favour,

as the comfort of the passengers is greatly increased. For vessels of moderate and slow speeds, where economy is the primary consideration, three distinct types are favoured.

The Combined Turbine and Reciprocator.—In this case the wing engines are reciprocators, and these exhaust into a low-pressure turbine driving a central shaft.

Geared Turbines.—This method is rapidly gaining favour for merchant vessels, the gearing seeming to stand the wear and tear in a remarkable manner. Both of these methods show a marked gain in economy over the ordinary reciprocator, and, doubtlessly, after their many advantages are fully realized, will supersede the former to a great extent.

The Triple and Quadruple-Expansion Reciprocating Marine Engines.—Both these types are largely installed in ships, and although no distinct advance has been made in the design, various methods have been adopted to further increase their economy. Superheating is now rapidly coming into favour, and the utilization of the exhaust steam for various purposes has materially tended to economy. The question of high vacuum is now being given the consideration its importance demands, and several improved auxiliaries have been evolved to this end.

Before concluding this article it is necessary to mention the "bladeless turbine," invented by a Swiss engineer. Of course, no data are available as to its construction, but it is understood that blades are dispensed with, and that the rotation of the drum is brought about by the "lick" of the steam supplied by nozzles in the drum casing. This turbine is reversible, and it is claimed that as regards space, weight and cost it is immeasurably superior to any other type of prime mover. Should the trials now being carried out prove successful this type will entirely revolutionize naval and marine engineering, and should prove a formidable rival to the marine Diesel as regards economy and flexibility. At a later date the author hopes to discuss the economical combination of the impulse and reaction turbine as applied to marine propulsion, showing details of construction. Up to the present, however, sufficiently reliable data are not available for this purpose.

"Turbo."

THE ASSOCIATION OF ENGINEERS-IN-CHARGE.

THIS somewhat young but flourishing association held its 19th annual dinner at the Holborn Restaurant, King's Hall, on Saturday, the 21st March, when the President of the Association, Dr. R. T. Glazebrook, C.B., M.A., D.Sc., F.R.S., took the chair Among those present were the following:—Sur.-Gen. Sir Alfred Keogh, K.C.B., F.R.S., Rector Imperial College of Science and Technology; H. S. Hele-Shaw, Esq., D.Sc., LL.D., F.R.S., M.Inst.C.E., Immediate P. President; Sir Boverton Redwood, Bart., F.R.S.E. (President, Junior Institute of Engineers); Sir Thomas D. Pile, LL.D., J.P.; Capt. H. Riall Sankey, R.E. (ret.), M.Inst.C.E.; W. H. Patchell, Esq., M.Inst.C.E., M.I.Mech.E.; Leslie S. Robertson, Esq. M.Inst.C.E., Secretary Engineering Standards Committee; W. Slingo, Esq., M.I.E.E.; B. A. Raworth, Esq., Wh.Sc., M.I.Mech.E.; H. C. Gunton, Esq., M.I.E.E.; H. P. Boulnois, Esq., M.Inst.C.E., M.I.Mech.E.; H. A. McFerren, Esq., M.I.Mech.E.; Alex. Siemens, Esq., M.Inst.C.E., M.I.Mech.E.; H. C. H. Shenton, Esq., M.S.E. (President, Society of Engineers); Henry Adams, Esq., M.Inst.C.E., M.I.Mech.E., F.S.I.; J. S. Critchley, Esq., M.I.Mech.E., M.I.A.E. (President, Institute Automobile Engineers); Alex. Ritchie, Esq., J.P.; F. C. Raphael, Esq., M.I.E.E.; S. A. Cooper, Esq., M.A., M.Inst.C.E.; W. Noble Twelvetrees, Esq., M.I.Mech.E.; Kenneth Gray, Esq. (President), M.I.H. and V.E.; Eng. Com. J. E. Mortimer, R.N. (ret.), M.I.Mech.E.; W. H. Booth, Esq., F.G.S., M.Am.Soc.C.E.; Frank Broadbent, Esq., M.I.Mech.E., M.I.E.E.; H. D. Wilkinson, Esq., M.I.Mech.E., M.I.E.E.; F. W. Bridges, Esq.; Mr. H. E. Neale (Chairman of the Association), vice-chairman of evening; Mr. J. R. Manning (vice-chairman of the Association); Mr. Hy. Swann, hon. treasurer; Mr. Alfred E. Penn, hon. secretary; Mr. A. Davey, M.I.Mech.E. (past chairman); Mr. Hy. Capsey, late hon. secretary; Mr. W. H. Ball, hon. social secretary; Mr. Wm. McLaren, chairman General Purposes Committee; Mr. J. E. Watkins, chairman Educational Committee; Mr. R. Thorp, chairman Social Committee; Mr. A. J. Adams, chairman Parliamentary Committee; Mr. W. A. Lester, chairman Finance Committee; Mr. H. A. Murray, Mr. C. A. Pickles.

Covers were laid for 340 and the capacity of the King's Hall was utilized to the fullest extent. The toast list was interspersed with musical items, and the function generally was one of the most successful organized by the Committee.

THE TRAINING OF THE MARINE ENGINEER.

SO frequently do we receive enquiries from parents and guardians as to the necessary requirements for the training as a marine engineer that it may serve a useful purpose if we briefly recapitulate the steps and advise, as almost a first necessity, the procuring of a copy of the Board of Trade Regulations relating to the examination of Marine Engineers, obtainable through any bookseller, price 6d.

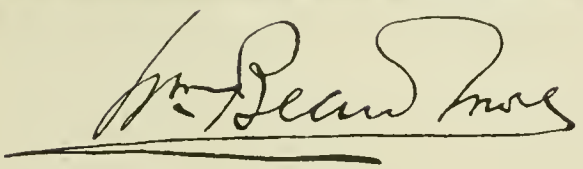
In the regulations will be found most of the necessary information as regards preliminary apprenticeship, etc. Apprenticeship periods are usually for five years, and are best served with a firm manufacturing or repairing marine engines, although stationary engine and other machinery experience is allowed to count with additional qualifying service if below the standard required by the Regulations (section number 36).

The technical training required, apart from the apprenticeship, is in most districts obtainable at the technical schools, colleges or universities, and a study of our advertising columns will give a comprehensive list of books and other literature likely to be of service in guiding a choice of suitable subjects as well as providing more detailed information than we are able to give in a short paragraph.

At the termination of the apprenticeship the opportunities of securing a berth on a steamer are most readily obtained at a marine engine workshop, a repair works, or on the shore staff of a fleet of steamers. The first few months may not be as a watchkeeper on a large vessel, and hence the qualifying service may be better obtained on a smaller vessel to comply with the Regulations. The period of sea service required being complied with, the candidate is at liberty to enter for the second class certificate examination, and after a similar period for the first-class certificate.

The regulations give four years as the *minimum* apprenticeship in the workshop, but most of the shipping lines require a candidate for an engineer's appointment on one or other of their steamers, to have served five years, and especially is this advocated in order that the practical workship training may be more efficient. The elementary questions embodied in this handbook will be found to be of much value in guiding the apprentice in the direction of his studies, and there are several excellent books on the market giving concise and complete answers as well as a variety of similar matter.

Photo, Elliott & Fry.



SIR WILLIAM BEARDMORE, Bt., of Parkhead Steel Works and Dalmuir Shipyard, on whom, as shortly noticed in our last issue, His Majesty the King recently conferred the honour of baronetcy, was made the subject of a congratulatory demonstration in Glasgow on March 14th, which ranks as one of the most notable testimonials to industrial eminence and personal worth ever paid in this country. This was the presentation, in one of Glasgow's theatres, in the presence of about 5,000 of the workmen employed by Messrs. William Beardmore & Co., Ltd., at Parkhead, Mossend and Dalmuir, of an illuminated address congratulating him on the Royal honour. The address, which measures 11 ft. 10 in. by 5 ft. 4 in., was beautifully designed by artists in the employment of the firm, the work being executed by Messrs. Maclure & Macdonald. In the centre panel is placed a portrait of Sir William, and in panels at either side over 5,000 signatures of employés of the firm are inscribed. The whole is surrounded by a border of a tasteful design in colours, with inset photographs of the works and different products of the company. The inscription is as follows :—" To Sir William Beardmore, Baronet—We, the signatories to this address, members of the staff and workmen employed at the Parkhead, Dalmuir and Mossend Works of William Beardmore & Co. (Ltd.), desire to express to you our respectful and hearty congratulations upon the high honour conferred upon you by His Majesty King George the Fifth. We take the opportunity of conveying to you our warm appreciation of your character as a man and an employer, and of those qualities of strong unswerving courage and lofty enterprise, together with that kindly consideration and generous recognition of merit in others which marks you out as a veritable captain of industry. That continued success attend you and long life and happiness be granted to you and your good lady, Lady Beardmore, is our earnest wish and prayer." Sir William and Lady Beardmore were also presented with a beautiful silver epergne of antique design.

Mr. David Girdwood, secretary of the company, presided, and the presentations were made by Mr. R. H. Henderson, representing the Parkhead Works ; ex-Bailie Herd, representing the Dalmuir Shipyard ; and Mr. J. McPherson, representing Mossend Steel Works, all of whom in the course of their speeches referred to the high esteem in which Sir William Beardmore is held by all classes of his employés.

In his reply, Sir William said he did not think an employer had ever been so honoured by his men, and certainly not in the twentieth century. The illuminated address, bearing the signatures of over 5,000 men—all loyal supporters of the Beardmore firm—was, he thought, a document unique in the industrial history of Scotland. It would be handed down to posterity as showing the good feeling existing between employer and employé. It was entirely due to the loyal support he had received from them and the co-operation of one and all that had built up that great business—one of the most important, if not the most important in Scotland—giving employment to over 12,000 men directly, and indirectly to many thousands more. Their works consumed over 500,000 tons of coal per annum, and turned out steel plates, steel forgings, railway wheels and axles, armour plates, guns, ships and engines to the value of £3,000,000 per annum, and distributed in wages close on £1,250,000 every year. Referring to the history of the firm, Sir William said that what was originally known as the " Old Forge " was started in 1835 by David Napier, but it did not seriously begin its growth until about 1858 or 1860, when his father, associated with Mr. Rigby, first of all, and later with his uncle, added to the forge a rolling mill for the production of ship and boiler plates. He could look back for a good many years upon his connection with Parkhead Forge He started his apprenticeship in 1871, and he was glad to see present that day a goodly number of old faces with whom he had been familiar all these years, He wished to give those veterans a specially hearty greeting. One of the chief factors in the success of the business had been that whatever profits had been made had been utilized in putting down more plant, replacing old machinery with new, and extending the operations in different directions. The wisdom of this policy had enabled the firm to obtain further capital. The other chief factor in their success had been the good relations and good understanding which had always existed between the management and the men. Clearly capital was useless without labour, and on the other hand, labour was at a sad discount without the aid of capital. The working of the two in harmony was therefore essential to success. He valued highly the honour which had been conferred upon him by His Majesty the King, because he saw in it a recognition of the good work which through the skill and splendid service of them all—his fellow workers—he had been able to do for their country.

THE Cunard liner *Aquitania* will soon be ready for her first voyage. The decorations are on a most sumptuous scale. The first-class smoking-room which is 76 ft. by 52 ft., is adapted from a Charles II. room at Greenwich Hospital. The iron balustrade of the main staircase has been copied from a French chateau.

INSTITUTE OF METALS.—The annual general meetings were held on the 17th and 18th of March, when the report of the Council was presented and the new president, Engineer Vice-Admiral Sir H. J. Oram, K.C.B., delivered an interesting address. In the course of which he said that the propelling machinery in a battleship contains a weight of non-ferrous metals equal to 17 per cent. of that of the contained steel and iron ; twenty years ago it amounted to about 34 per cent. of the steel and iron, or just double the percentage at present obtaining. In the hull structure, excluding the propelling machinery, the proportionate amount of non-ferrous metals has not been reduced, being now 4·4 per cent. of the iron and steel, while twenty years ago the proportion was 4·2 per cent.

SHIPPING, ENGINEERING AND MACHINERY EXHIBITION.

SINCE the list of firms who have booked space at Olympia, for this exhibition, was published in our last issue, the following have been added to the list:—Messrs. The Edison Accumulators, London; Gebruder Seck, Dresden; G. St. John Day Co., Oldham; D. Harper & Co., London; D. & W. Henderson & Co., Glasgow; W. R. Howell & Co., London; Henry Hughes & Co., London; Metal Jointing Co.; Miralite Co., London; North British Rubber Co., Edinburgh; Port of Lisbon; Dock & Harbour Models, Sabielny, Hans, Dresden; Seck Engineering Co., London; Timber Fireproofing Co., London; Westinghouse Brake Co., London. The extraordinary attitude taken by the Machine Tools' Association towards the exhibition has excited very severe criticism on the part of many of the members, endorsed by those members of the committee of the exhibitors who have been made aware of the circumstances. Several firms who are members of the Association had booked space in the exhibition, and have received notice from the Association that they have not the right to do so, the Association having the exclusive right to organize exhibitions on behalf of the members. Such an attitude is so coercive, that it becomes a very serious interference with the liberty of the subject. We cannot realize how the council of any society should adopt such a high-handed policy, and we hope for the sake of all concerned that some misunderstanding has brought about the notices sent to intending exhibitors who are threatened with penalties for desiring to patronize an exhibition which is calculated to benefit those who have business relations with the shipping, shipbuilding and engineering trades of the country. It may be noted here that a special section is being devoted to loading, discharging and conveying equipments in connection with ships and docks.

LETTERS TO THE EDITOR.

To the Editor, Marine Engineer and Naval Architect.

Dear Sir,—Having read the interesting letters in your paper on the proposed substitution of technical college time in place of actual sea service as a qualification for the Board of Trade certificates, may I venture to add my protest to those already given? This proposed substitution will, in my opinion, be a very dangerous thing, for as all marine engineers know, and know full well, there is a kind of instinct, or sixth sense if you prefer to call it so, which is acquired by an engineer who is in charge of running machinery, and which can only be acquired by actual service in an engine-room, an instinct which makes a man, in time of stress and emergency, do the right thing at the right time without having to stop and reason things out before acting, and until a man has acquired that instinct he is not at his greatest efficiency as an engineer. The Board of Trade's suggestion for increasing the sea service to eighteen months for a second class, and a further eighteen months for a first-class certificate is a very sound proposition, and acknowledges the necessity for this instinct to be developed, and the necessity for an engineer to be perfectly familiar with the behaviour of his engines and auxiliary machinery while under steam. Then why weaken this acknowledgment by proposing to substitute time spent in a technical school? Surely it must be apparent to any man that time spent sitting at a desk in a technical college, or playing at practical engineering in a technical laboratory, is a very different thing from being actually in in charge of, and responsible for, the complicated mass of machinery which a modern sea-going engineer has to take under his care while on watch. No doubt a technical college trained man may be able to do better at calculus and higher mathematics, and be a prettier draughtsman than a practically trained man, but these things are only accessories, very useful no doubt, but still only accessory to the making of an engineer; and I would like to ask which man is most to be relied on in an emergency? The technical-practical man or the practical-technical man? And marine engineers are essentially practical, technical men. They are men who are trained practically in the hard school of the workshops as apprentices, where work has to be done properly, and moreover efficiently, and in the engine-room at sea, and who have in addition to learn no inconsiderable amount of technical knowledge if they ever hope to gain their Board of Trade certificates. And quite right too, that they should be properly trained in this manner, for the safety of our ships and the lives of all on board are often, far oftener than is imagined, in the hands of the engineer on watch. Further, this proposed substitution is going to weaken the whole status of the certificate, for if this proposal comes into force, it will be quite possible, and indeed very probable, that we will be met with the sneering remark that sea experience is worth nothing, for the Board of Trade itself has spoken and said that any board school boy who has attended a technical college is every bit as good as a man who has been through the mill, and given his time to the gaining of experience and learning his business in the only school where that business may be learned, namely, in the "shops" and at sea. Therefore I would ask all marine engineers to join together, and present a hard, unyielding front, and say "There must be no substitution of any sort for sea service whatsoever. A practical apprenticeship of not less than four years and a definite period of actual sea service must be the only qualification for a Board of Trade certificate."—I remain, faithfully yours,

A SEA-GOING ENGINEER.

London, March 12, 1914.

OTAGO HARBOUR BOARD.

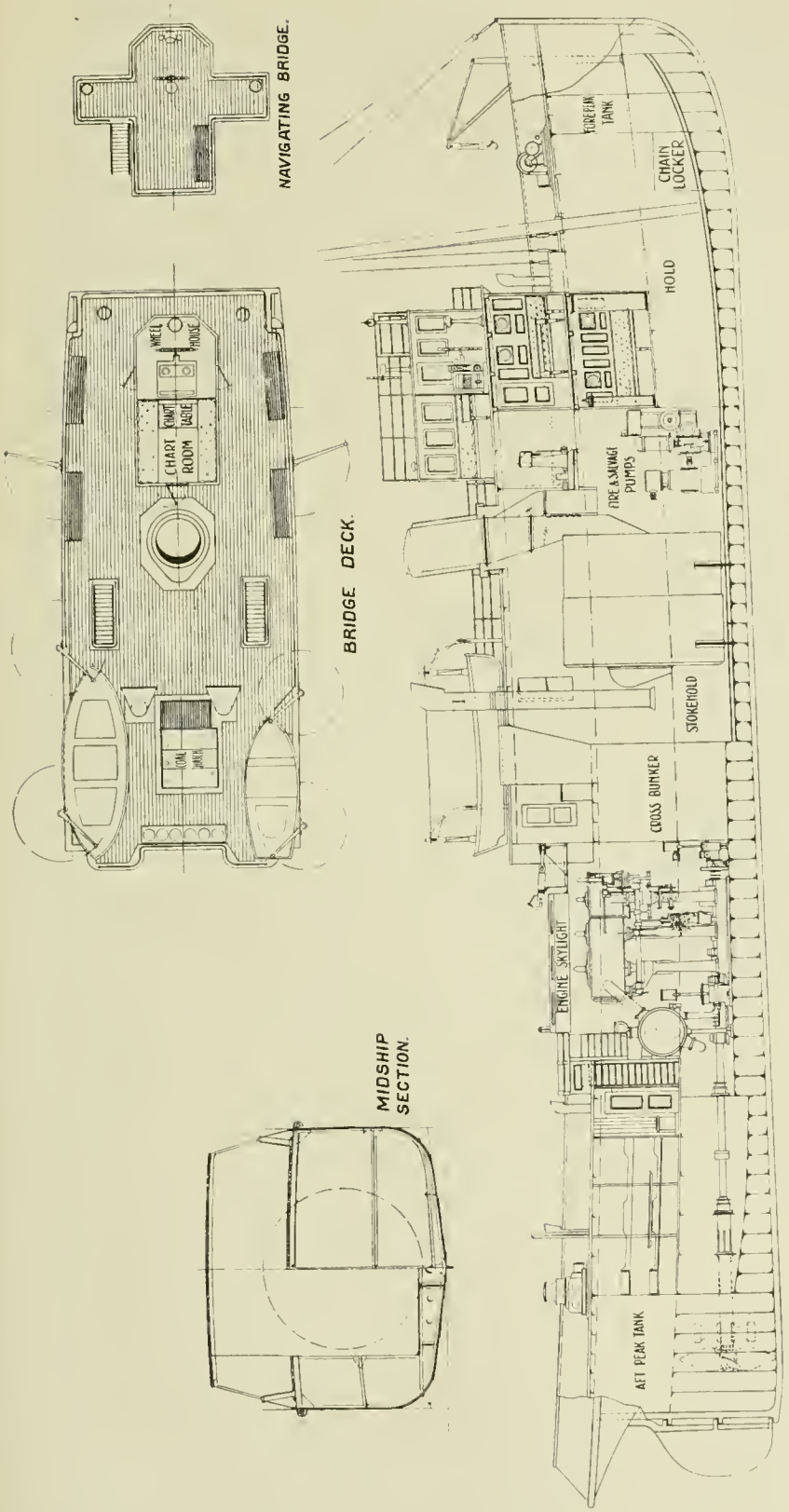
Twin-Screw Tug and Salvage Steamer.

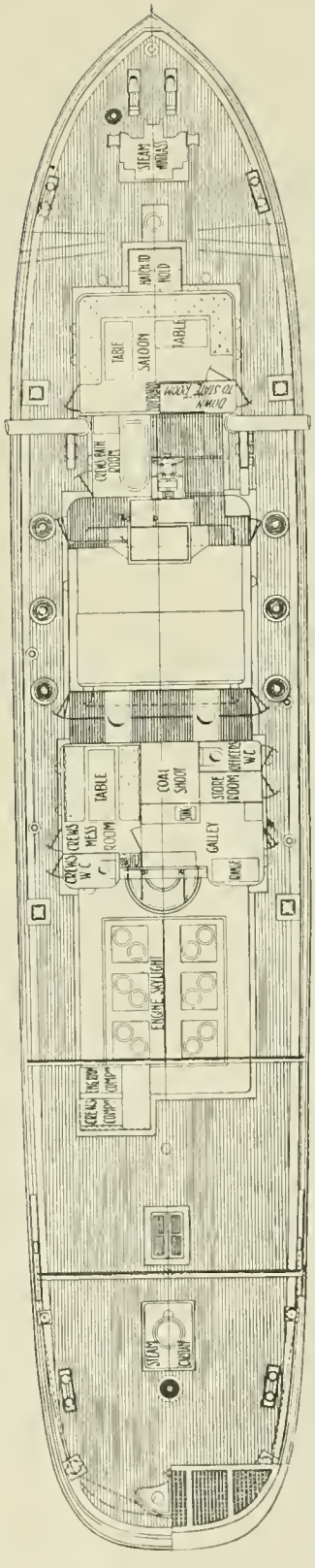
A STEEL twin-screw tug and salvage steamer, which is named the *Dunedin*, was launched on Wednesday, the 7th January, 1914, from the shipyard of the contractors, Messrs. Stevenson & Cook, of the Maori Iron Works, Port Chalmers, to the order of the Otago Harbour Board.

The vessel, the general design of which is shown in the accompanying illustration, has a length over all of 132 feet, length between perpendiculars 124 ft. 6 in., breadth moulded 25 ft., depth moulded amidships 13 ft. 6 in. and a mean draught in sea-going trim of about 11 ft. She is constructed entirely of mild steel, in accordance with plans and specifications supplied by the Board, from a design prepared by their engineer, Mr. J. Blair Mason, M.I.C.E. She is designed for harbour and over-sea towage, salvaging operations and fire-extinguishing service. In view of over-sea service, she has been given ample free-board, considerable sheer and full deck lines forward.

The vessel has a flush main deck, straight stem, elliptical stern and bulwarks all round with rail set well inboard. A bridge deck amidships covers the machinery casing, galley, store-room, mess-room for crew, bath-room, saloon and other conveniences. State-rooms are provided, fitted and finished in a superior manner, one for ladies. Ample accommodation for the crew is provided below the main deck abaft the engine room, with berths for ten men. The captain's room is on the starboard side, and the mate's room on the port side. The accommodation is on a somewhat unusual scale in its extent and appointments, so that the tug may undertake long cruises and afford the fullest services when tendering vessels, or engaged in salvage work.

On the bridge there is a wheel house in which is fitted a steam and hand-steering gear, also the usual telegraphs, speaking tubes, etc. Joined to the wheel house is the chart room, comfortably and conveniently fitted and equipped. There are two lifeboats carried





Tug and Salvage Steamer (Otago Harbour Board), New Zealand. Length b.p., 124½ feet. Beam mld., 25 feet. Depth mld., 13½ feet.

on the bridge, with the usual davits and gear. Two towing bows and two patent spring slip hooks of substantial construction are provided, arranged to give the tow rope a clear sweep of 180 degrees from port to starboard. A navigating bridge is constructed on top of chart and wheel house, from which a flying bridge extends to the sides of the vessel. On this bridge is fitted a standard with steering wheel, also two telegraphs, compass and powerful searchlight. There is a hold forward, which may be used for the stowage of hose and fittings for use in connection with fire and salvage pumps, and for coal in addition to bunker supply. A powerful patent direct steam windlass with double cylinders, reversing gear, levers for hand power, and warping ends on intermediate shaft, is fitted near the bow to work the forward hatch. Also a powerful patent direct steam warping capstan, with compound barrel, double cylinders and reversing gear, is arranged abaft the towing bow.

The propelling machinery consists of two sets of three-cylinder triple-expansion engines, with cylinders 13½ inch, 22½ inch and 37 inch diameter by 27-inch stroke. Steam at 180 lbs. pressure is supplied by a cylindrical multitubular boiler of the type known as "Inglis Marine Boiler," having three furnaces and fitted with fan for induced draught. The surface condenser is of the Contraflo type, and is common to both sets of engines. The air pump is independent direct steam driven, also the feed pumps. The circulating pump is of the centrifugal type, coupled direct to vertical open fronted single-cylinder engine. The auxiliary plant has been supplied by Messrs. Richardsons, Westgarth & Co., of Hartlepool.

The salvage plant consists of two pumps of Merryweather & Sons' 15-inch latest type "Waterspout" pattern centrifugal pumps, driven by direct-coupled single-cylinder enclosed type high-speed engines, embodying all the latest improvements; each pump capable of delivering 3,500 gallons per minute. A powerful steam fire pump of Merryweather's latest pattern double-cylinder vertical type is installed, capable of delivering 2,000 gallons per minute. The equipment of hose, pipes, suction and delivery heads, nozzles and all fittings and connections are extensive and complete and include a 5-inch swivelling monitor with several sizes of nozzles. The electric light is installed throughout the vessel, and she is fitted with a 16-inch projector, giving a powerful searchlight.

The vessel is built under Board of Trade and Lloyd's special survey and in accordance with the N.Z. Government's requirements. She will be capable of a speed of thirteen knots.

Cast-Iron Brazing.—Our attention has been called to some work done on cast-iron frames and cylinders of a reliable character, judging from the evidence adduced along with the illustrations showing the repairs which had been effected by means of a brazing process. A cracked pump chest or a stuffing-box gland may be repaired by the process, and even brackets which bear a strain, mainly of a crushing character, may be dealt with efficiently. There are many cast-iron details which are either patched or condemned in the usual course by reason of cracks; some of these at least might be made good by brazing. A demonstration of the process is shown by arrangement on application and as the results appear to warrant it, we call the attention of our readers to the process, in the assurance that it may be of value to some to know of it.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent).

Clyde-built Submarines.—Very special interest attached to the launch on February 28th from the yard of Scott's Shipbuilding and Engineering Co., Greenock, of the submarine *S1* for the British Government. Not only is the vessel the first submarine ever built in Scotland—indeed, apart from Barrow-in-Furness and the Royal dockyards, she is the first submarine constructed in Great Britain—but she is the very first of her special type to be built in this country. This is the Laurent type, as built by the Fiat San Giorgio Co., of Spezia, Italy, for which Scott's Co. hold the licence in Great Britain, and which embodies in its design an outer hull intended to favour the highest propulsive efficiency and reserve buoyancy on the surface, with the minimum of draught, and an inner hull intended to minimize the internal cubic capacity while ensuring satisfactory conditions when submerged. The vessel will be propelled by oil engines of six-cylinder Fiat type, one on each side of the centre compartment of the submersible. Adjoining the engine-room are electric motors for main drive under water. The inner hull is divided into water-tight compartments. The keel, which weighs about 12 tons, is detachable from the interior of the vessel, so that the weight can be decreased while under water.

The Clyde in future seems likely to be closely associated with the development of the submarine fleet of the British Navy. Three submarine craft have lately been under overhaul by the Scott Co., and for accommodating the crews of these vessels H.M.S. *Pactolus*, a depot ship for submarines, has for several months been stationed at Greenock. She is not furnished with motive power but early in March she was towed to Ardrossan, where she will henceforward be stationed as a feature in the equipment of what will be the base for submarines for the West Coast of Scotland. The building of submarines is also to be undertaken by Messrs. William Beardmore & Co., Ltd., Dalmuir, and at the west end of their large establishment work is proceeding on a new building slip, which is intended should specially serve for the construction of this particular class of warship. Reference to Messrs. Beardmore & Co. taking up submarine building was openly made by Colonel Smith Park, of the Beardmore directorate, on the occasion of the trial trip of the Allan liner *Alsatian* in December last, and it was then also stated that the firm intended to enter upon the building of the very finest engines for airships that had yet been devised.

Motor Ships.—Motor shipbuilding on the Clyde may now be considered as having fully established itself. With the launch of the *Mississippi* for the Atlantic Transport Co., and of the twin-screw motor ship *Falstria* for the East Asiatic Co., launched on March 12th, Messrs. Harland & Wolff have now to their credit two large motor ships, the machinery for which has been made by the Burmeister & Wain (Diesel system) Oil Engine Co., Glasgow. There has come to the Clyde also to be converted to motor-propulsion the third of the East Asiatic Co.'s steamers. At present, therefore, there are five large motor ships at various stages of construction or conversion in Glasgow harbour, with all of which Messrs. Harland & Wolff and the Burmeister & Wain Oil Engine Co. have to do. It is understood that there are at least five other motor ships on Messrs. Harland & Wolff's stocks at Govan, or about to be laid down there, making a total of ten motor ships. The machinery for the whole ten vessels is being made by the Burmeister & Wain (Diesel System) Oil Engine Co., whose works (formerly the engine works of the London and Glasgow Shipbuilding Co.) are at Lancefield Quay, on the opposite side of the Clyde from the Harland and Wolff shipyard. As is well known both the shipbuilding and engineering firms mentioned are presided over by the one head, Lord Pirrie, whose name, in so many directions connected with shipbuilding and engineering, is now synonymous with gigantic enterprise and success.

Dredging Craft.—Dredgers of either the bucket ladder or pump suction type keep well in evidence as a Clyde speciality. Since last month's notes were penned Messrs. Wm. Simons & Co., Ltd., Renfrew, have launched complete

and ready for work two of the batch of powerful twin-screw "Simons" Cutter Suction Reclamation Dredgers, which they have on order for the Russian Government, and particulars of which are given in the Launch Section.

Floating Docks.—Floating Docks, which as a speciality only one Clyde firm, Messrs. William Hamilton & Co., Port Glasgow, have yet taken up, are also in evidence in recent output records. The firm named, who have already a number of much larger docks to their credit, built for Continental ports, launched on February 26th a steel double-walled floating dock of the box type, which has been built to the order of the British Admiralty, a detailed description of which is given elsewhere in this issue.

Notable Speed Trials.—Successful speed trials were carried out on the Clyde during March with a larger number of steamships of notable character than at any similar period for some time past. Most interesting of these perhaps was the quadruple-screw turbine-propelled Allan liner *Calgarian* built by the Fairfield Company and a sister vessel to the *Alsatian*, completed a few months ago by Messrs. Wm. Beardmore & Co., Ltd., Dalmuir, and now on service between Liverpool and the St. Lawrence. The speed trials of the *Calgarian* consisted of seven double runs on the measured mile, beginning at a speed of 11 knots and working up gradually to a speed of 21·25 knots. On the last double run the mean speed was 20·634 knots, which is a knot and a half more than that which will be required in regular service. In the course of the manœuvring trials the vessel turned a complete circle to port in 3 minutes 45 seconds, and a complete circle to starboard in 4 minutes 35 seconds. The vessel later went successfully through a continuous 600 miles' run. Some days previously trials were successfully gone through by the Royal Holland Lloyd liner *Tubantia*, built by Messrs. A. Stephen & Son, Linthouse, for mail and passenger service between Amsterdam and South America, and a sister ship to the *Gelria*, now on that service. During the whole of the trials the machinery worked satisfactorily and a mean speed of 17½ knots was maintained on the measured mile as compared with 17 knots in the case of the *Gelria*, this speed being in considerable excess of contract requirement. Two other ocean steamships of note put successfully through their trials were the British India Steam Navigation Co.'s twin-screw steamer *Mashobra* and the single-screw steamer *Bandra*, both built and engined by Messrs. Barclay, Curle & Co., Ltd., Whiteinch. Other similar vessels for the same Company are now being completed by the Whiteinch firm.

Speed Trial Mishap.—In the Skelmorlie measured mile speed trial arena an untoward and most unfortunate occurence took place on Saturday, 28th February. This was no less than the running ashore of H.M. torpedo boat destroyer *Laverock*, built by Messrs. Yarrow & Co., Scotstoun, for the British Admiralty. The vessel was running her trials on the mile, and had completed her downward trip, the weather at the time being wet and dirty, but fairly clear, with a stiff southerly breeze. On making the sweep for the run back the *Laverock* was headed to port, and as she had a good offing there seemed no imminent risk of getting too near the beach. The vessel, for some reason as yet unknown, while going at a high rate of speed, failed to come round sufficiently to clear a spit of land, and she steamed hard aground at a part fortunately consisting of sand, gravel and small boulders. Notwithstanding all efforts by patching, lightening, and towing at getting the vessel off, she still remains, at time of writing, in her unfortunate position. The *Laverock* is a destroyer of the "L" class, and was originally named *Hereward*. She is the third of the four destroyers of the 1912-13 programme, which Messrs. Yarrow have built for the Admiralty. Her principal dimensions are:—Length, 260 ft., and breadth, 27 ft. 4 in. The main engines consist of Brown-Curtis turbines, driving two shafts transmitting equal powers, one propeller being fitted to each shaft. Steam is supplied by three of the latest and most improved type of Yarrow boilers, each of which is fitted with Yarrow's patent feed heating and superheating arrangements, and is designed for burning oil fuel exclusively. She was launched in November of last year.

Messrs. Wm. Denny & Bros., Dumbarton, have received an order from the South-Eastern and Chatham Railway Company for the construction of a new Channel packet with geared turbines. The vessel will be the largest of those that have up to the present been destined for the Channel service. The dimensions are as follows:—Length, 354 ft.; breadth, 42 ft. 8 in., and depth, 26 ft. It will be placed on the Calais-Dover route, the port of Calais being adapted to take boats of large tonnage, whilst Boulogne in this respect is not, in the present conditions, so suitable. The vessel will be fitted with the most up-to-date improvements.

The "Aquitania."—The most notable event in the year's record of shipbuilding on the Clyde will certainly be—but for unforeseen and untoward happenings—the departure of the huge Cunard liner *Aquitania* from her builder's basin, her passage down the Clyde, and her trials for speed and other properties on the Firth. The *Aquitania* will leave Messrs. John Brown & Co.'s outfitting basin at Clydebank for the Tail of the Bank on Sunday, 10th May, a day of the week upon which there is little inward and less outward traffic. In all likelihood the new Cunarder will have the all too narrow river practically to herself. The work of deepening the river, towards the cost of which Messrs. John Brown & Co. generously and voluntarily contributed £10,000, is still going on. Every effort is being made to ensure the safe passage of the liner to the Tail of the Bank. After a series of trials, the *Aquitania* will proceed to Liverpool, which port she is now billed to leave for New York on her maiden voyage on 30th May.

Greenock Harbour Trust, who, as recorded in last month's notes, have decided to provide a fitting-out crane of 150 tons capacity for the use of shipbuilders generally on the quay at the James Watt Dock, have been appealed to by Mr. William Millar, the managing director of the Greenock and Grangemouth Dockyard Co. on the advisability of considering whether a floating crane for the same purpose might not be preferable. The whole question is being gone into by a sub-committee of the Trust.

Messrs. Stewart & Lloyds, Ltd., the well-known tube manufacturers of Glasgow and Birmingham, are making arrangements for the manufacture of solid drawn tubes within the old Clydeside Tube Works, Whifflet; thus adding considerably to their productive capacities. When the plant has been laid down for the turning out of solid drawn tubes, it will mean the employment of a large number of additional hands.

Messrs. Hawthorns & Co., Leith, launched on 12th March the second of two duplicate twin-screw motor coasting vessels which they are building for Messrs. Elder, Dempster and Co., Liverpool.

THE TYNE.

(From our Own Correspondent.)

SIR Benjamin Chapman Browne, head of the firm of Messrs. Hawthorn, Leslie & Co., engineers, once declared in Newcastle that the ideal position for labour was when two employers were after one man. The present position on the Tyne more nearly approximates to that state in the shipbuilding and engineering trades, and indeed in all the cognate industries, than at any previous period in the history of the river. The yards are full of work and the demand for labour in every department of craftsmanship is particularly brisk and cannot be fully satisfied. The temporary check of the riveters' dispute has been satisfactorily adjusted and there is not much doubt that the revision of prices will now be arrived at on terms agreeable to both sides. The trouble of a joiners' strike at Elswick works is an instance of the keenness of the labour demand, for whereas some 120 joiners came out on strike to enforce the terms of contract for cork-dust installation, in a week or so ninety of them had found work in the house building trade and all the others, if they had cared to accept work, could have had it instead of drawing strike pay.

The shortage of labour notwithstanding, the new yard of Messrs. Armstrong, Whitworth & Co. at Walker is progressing as rapidly as the limitations of labour will permit. A staff of draughtsmen have been brought from Elswick and planted in temporary offices, pending the building of the elaborate new offices, and about 300 workmen have also been

transferred from Elswick to the new yard, which when in full working order will require a few thousand men. The Federal Malay 'Dreadnought' *Malaya* is now in frame, the first war vessel to be built at the lower yard and the problem of meeting the demand for houses for the new community which will shortly be in the area is one the local authorities are trying to solve. There are nine berths occupied at Elswick. The keels of three submarines have just been laid. The *Birmingham* cruiser—one of the 'city' class—has gone, but the men are very busy on the two Chilian 'Dreadnoughts.' There is a large amount of specialised merchantmen on the stocks. Messrs. Swan, Hunter & Wigham Richardson, Ltd., at Wallsend, have orders for large oil boats and high-class passenger steamers. On the other side of the river at Jarrow great progress is being made with the 'Dreadnought' *Resolution* and both the Jarrow and Hebburn yards are well supplied with work on oil boats and general cargo steamers.

At their new yard Messrs. Eltringham & Sons are making progress with the two trawlers and a tender laid down at the opening of the yard. The Tyne Iron Shipbuilding Co. and the Northumberland Shipbuilding Co., as well as Messrs. Readhead, at South Shields are all well supplied with merchant orders. The Tyne is exceptionally full with Admiralty work. Messrs. Swan, Hunter & Wigham Richardson have their second-class cruiser and so have Messrs. Hawthorn, Leslie & Co., in addition to the work in progress at Elswick and Jarrow.

The Admiralty programme includes for this year four battleships and three cruisers and twelve torpedo destroyers, and there are hopes that the Tyne will, as it did last year, get an important share of this national work. Material is a little cheaper, but the cost of labour is still high, and although there are many enquiries from the special trades we cannot hear of many new orders being placed. Builders are quite easy on this score, because their order books are full, but if the market shows a little falling off the opportunity will undoubtedly be seized by owners and merchants to place fresh orders.

Repair work is one of the most important lines on the Tyne. A new graving dock is being constructed at South Shields and one or two other docks are being lengthened and brought up-to-date, so now the Tyne is capable of dealing with every class of vessel except those of abnormal size. The future is very bright for work of this kind.

The principal marine engineers are full of Admiralty and other work and anticipate the placing of further orders for warships for one or more foreign powers.

THE WEAR.

(From our Own Correspondent.)

SUNDERLAND is the largest self-contained shipbuilding centre in the world. Whereas on the Tyne the shipbuilding industry is scattered about a great deal, it is on the Wear all within the borough boundary and this gives on the output of last year an astonishing total for one town and one which places Sunderland easily first. There is a large amount of tonnage on the stocks. Generally speaking all the builders have their order books full for merchant steamers.

Messrs. Doxford & Co., of Pallion, accomplished a notable feat when they built the *San Geranimo*, one of the largest oil boats yet built—over 15,000 tons. She went on her trial trip last month and her building is an indication that the Wear is coming into competition with the large shipbuilding centres in this class of work. All the yards are busy. Reports show that all the berths are filled at Messrs. Thompsons, North Sands, and at Messrs. Short Brothers.

The marine engineers are also full of work, though in the report of Messrs. Richardsons, Westgarth & Co., it is stated that the margin of profit does not give the industry a share in the prosperity which has been the lot of the shipbuilders and on the top of this announcement there is keen interest in the decision to be arrived at by the steelmakers in regard to prices.

Messrs. Geo. Clark & Co., are just finishing the engining of the vessel *La Habra* and it will shortly be ready for sea. They have other important work on hand and the works are going full time

THE TEES AND HARTLEPOOLS.

(From our own Correspondent.)

Middlesbrough.

Messrs. W. Harkess & Sons, Ltd., have amongst recent orders a coasting steamer for the Ellerman Liners, Ltd., the machinery for which will be made locally.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard.—An order for a cargo and passenger steamer has been received, the vessel to be similar to two vessels building by the Northumberland Shipbuilding Co., Howdon-on-Tyne, for Messrs. Furness, Withy & Co., Ltd., 420 ft. long, 12 knots at sea.

Messrs. Elder, Dempster & Co., Liverpool, have also placed a contract for a small cargo steamer.

Messrs. Smith's Dry Dock Co., South Bank, have docked, repaired and overhauled a large number of cargo steamers during the month and are reported to have booked two trawlers, the boilers for which will be built by Messrs. Richardsons, Westgarth & Co., Ltd. They have sufficient work to keep them busy all through the year.

Messrs. Richardsons, Westgarth & Co., Ltd., have received amongst new orders a set of triple-expansion engines and boilers of 4,000 I.H.P. for Messrs. Furness, Withy & Co.'s steamer building by Messrs. Sir Raylton Dixon & Co., also the machinery for the cargo steamer for Messrs. Elder, Dempster & Co., building by the same firm, and the machinery for a sister ship building by Messrs. Palmer & Co., Jarrow-on-Tyne.

The Foreman's Mutual Benefit Society, Tees and Hartlepools Branch, visited the works of The Darlington Forge Co. and reported the immense amount of work on hand in the shape of steel castings and forgings for the Admiralty and German ship and engine builders. This firm is extending rapidly and is now one of the largest of its kind in the world.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have secured the contract to build a cargo steamer for Messrs. R. MacAndrew & Co., London, also another small cargo steamer on the arch principle for Newcastle owners, a sister ship to the s.s. *Thyra Menier*, to steam 9½ knots, designed by Mr. Maxwell Ballard.

Messrs. R. Ropner & Sons have secured the contract to build six barges for the Tees Conservancy Commissioners, which with other work will keep them busy throughout the year.

Messrs. Blair & Co. have a large amount of work on hand, and they have secured the contract to supply the engines and boilers for a cargo steamer building on the Tees.

West Hartlepool.

Messrs. Furness, Withy & Co. have recently sold the s.s. *Corunna*, 3,810 gross tons, also the s.s. *Flodden*, 4,226 gross tons, to N. V. Furness, Scheepvart en Agentimes Maats. Rotterdam, who have renamed them the s.s. *Tenbergen* and s.s. *Vrybergen* respectively, also the s.s. *Richmond*, 2921 gross tons, to Russian Ship Owners.

Messrs. W. Gray & Co., Ltd., have booked another large order during the month for a cargo steamer, 420 ft. long, and 7,200 tons dead weight. Their dry docking department has been very busy.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, will as soon as possible lay down two steamers of about 6,500 tons deadweight, for the British Empire Transport Co., Ltd.

The Central Marine Works of Messrs. W. Gray & Co., Ltd., have booked the contract to supply the engine and boilers for the cargo steamer previously mentioned, they also have a large order on hand for stampings for Messrs. J. A. S. Howden and Sons, Glasgow.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton yard, will shortly lay down two steamers of about 8,000 tons deadweight and 1,800 I.H.P. for the British Empire Transport Co., Ltd., part of the ten steamers to be built by the firm for the Houlder and Furness Combine.

Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, engine works, have a larger amount of work on hand than they have had for some years, having secured all the orders for the engines and boilers for the ten British Empire Transport Co. boats. These orders, together with the work already on hand will keep them busy for at least twelve months. They also have several very good engines on hand.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Lloyd's Register.—At the Imperial Hotel, Hull, a complimentary banquet was recently given to Mr. A. B. Wilson, of Lloyd's Register, who has retired from the position of principal surveyor. Presentations were also made to Mr. Wilson of a gold watch and a purse of gold, and to Mrs. Wilson, a gold wristlet watch. Mr. A. Cochrane, who presided, said he had known their guest forty years. Since Mr. Wilson had come amongst them, he had won their respect and esteem, he had been a faithful servant of his Company, and at the same time a reasonable surveyor. They would be pleased that although he was retiring he was not going to leave the district. Mr. Wilson returned thanks on behalf of himself and his wife.

New Joint Dock.—The Engineer of the Humber Conservancy Board reports that the new Joint Dock, together with the extension, is practically completed, and water admitted; the lock gates are finished and in use, and the dam has been removed, and other work connected with the dock practically completed. The total cost of the undertaking will not be far short of £3,000,000 sterling. The dock has been constructed by the North-Eastern and Hull and Barnsley Railway Companies, and is the largest, and will be the best-equipped dock on the East Coast. It has been announced that the King and Queen will open the new dock on Friday, 26th June. It is stated on good authority that all quay space has been allotted to different large Steamship Companies, and the Australian trade is expected to develop immensely.

Floating Crane.—The Hull Joint Dock Company has placed an order for a 80-tons floating crane for the new joint dock with the Dutch firm of Messrs. Werf Gusto, of Schiedam, near Rotterdam; both English and Continental firms were invited to tender, but the price quoted by the Dutch firm was much lower (about 40 per cent.) than the lowest English tender.

Salt End Oil Jetty.—This jetty, or pier, reaching 1,500 ft. into the river, for oil tank steamers on the river Humber, is very nearly completed; 222 piles have been driven for the pier. The T end will shortly be finished, and the largest steamers carrying oil will be able to come alongside at any state of the tide. 831,624 tons of material have been dredged away. There are a great number of large oil-tanks built on the river side, ready to receive the oil pumped from the steamers, and the Railway Companies expect to develop this particular trade for the Humber district.

Hull Shipping.—The coal shipment of the port is not up to normal yet. A good number of P. & O. and other steamers are coming to the port from Australia with wool and fruit. There are also a fair number of steamers discharging grain cargoes from South America and India, and steamers about due from the far East. Messrs. Furness, Withy & Co.'s steamers will soon start on the Montreal trade, bringing large cargoes of Canadian produce, etc., to the port. This firm is greatly developing the Canadian trade between Hull and Montreal.

Quick Despatch at Hull.—An instance of the rapidity with which coal can be loaded at the conveyors, Alexandra Dock riverside, was clearly demonstrated recently. The s.s. *Gelderland*, one of the Shipping and Coal Co.'s up-to-date fleet of self-trimming colliers, arrived at the conveyor on the 16th March and after having taken 2,700 tons of cargo and 90 tons of bunkers, sailed for Hamburg at 6 a.m. on the following morning. The steamer was loaded in five working hours. This, with an unavoidable stoppage of about 40 minutes, gives an average loading of about 560 tons per hour, and is believed to constitute a record for quick loading on the Humber.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, have the largest trawler in the world fitting out in Queen's Dock, Hull. Her crew will consist of forty-five men. The vessel is fitted up with every up-to-date appliance. Her cost will be about £15,000, and she is a great credit to the builders. The firm of Messrs. Amos & Smith are fitting boiler and engines in her. Wireless telegraph apparatus will be fitted.

H. Scarr, shipbuilder, Hull, is building steel lighters for local owners, also water boats for dock use.

Messrs. Livingstone & Cooper, Ltd., shipbuilders and engineers, Hessle.—This new firm of shipbuilders are very busy building three drifters for Yarmouth owners; one is now plated and will soon be launched, the second is in frame and the keel of the third is laid. The yard is well equipped with machinery, etc. A suction gas plant and engine is fitted and a large dynamo provided for lighting the yard. There are motors to drive the wood machinery and large punch and shearing machine. The new firm is open to build coasters, tugs, trawlers, steam wheelers and shallow draught vessels.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are fully occupied with new work and have increased their night shift; all machines are kept at high pressure to deal with the ever-increasing orders. The branch shop at Alexandra Dock is kept well employed with general repairs and graving-dock work.

North-East Coast Engineering Works (Hull), Ltd., have done repairs on the following steamers—s.s. *Bisp*, s.s. *Woodlea*, s.s. *Remus*, s.s. *Winchester*, R.M.S.P. *Parana* and *Conway*. The repairs have been the usual engine and deck kind; new insulator on the *Parana*, *Winchester*, and a new funnel, etc.

Messrs. Cooper & Co., Ltd., engineers and repairers, have had a few steamers under repair at the different docks. Their own graving dock has been kept fairly well employed with coasters, etc., and the moulding shop with new propellers (patent) for home and foreign ship owners.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, are extremely busy building engines and boilers for trawlers and coasters, and are booked far ahead.

Messrs. Woodall & Co., engineers.—The smith's shop is fully employed on forgings for stern posts and sterns for different small shipyards throughout the country, and for the London County Council, etc., etc.

Messrs. Stewart & Craig, engineers and boilermakers, have effected deck and engine-room repairs during the month on the following steamers:—s.s. *Pallas*, s.s. *Orion* *Walkure*, s.s. *Transport*, the Russian Government cadet ship *Duchess Maria Nicholewena*, and other steamers.

Thomas Tate, engineer and boilermaker, Clarence Engine Works, has had a spendid month on general repairs in the engine-room and deck, also graving-dock work.

Fish Dock, Hull.—The small shops around the dock are kept very busy opening out boilers and engines for Lloyd's surveys and local clubs, and in doing general repairs to a number of Iceland trawlers, who through the stress of bad weather and heavy seas are now undergoing repairs.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Southampton.—Rumour has been busy here lately in consequence of a statement by the Chairman of the L. and S.W. Railway Company at a recent meeting. The statement was to the effect that important developments were in contemplation, and that it was expected that one or two new lines would be calling at Southampton within the next six months. The rumour had it that the Australian service of the P. & O. Company would be concentrated here, but the dock officials know nothing of this; however, in view of the railway company's chairman's statement, an expansion of trade here is confidently expected. The Cunard Company's service to Canada has been improved by bringing the three latest ships from the Mersey, *viz.*, the *Ansonia*, *Andania* and *Alaunia*, which will maintain a fortnightly service from this port. According to the statement, the developments were expected chiefly in connection with passengers disembarking here, and, secondly, that this would also mean

freight traffic as well; whether the freight would be refrigerated cargoes or not was left to speculation, but as is well known, Southampton has excellent cold storage accommodation to offer. Two notable vessels were despatched from this port on the 12th of last month, one being the *Imperator* and the other the *Cap Trafalgar*. Thus the largest vessels employed in Germany's North and South American trades were in the port together. The *Imperator* has been in the workmen's hands for some months, and was on her first voyage since the alterations had been made. The *Cap Trafalgar* was on her maiden voyage to the Plate. She is the largest vessel engaged on the South American service and was built by the Vulcan Works, Hamburg. Her dimensions are as follow:—Length 590 ft., breadth 72 ft., depth 40 ft., gross tonnage about 18,700. The propelling machinery consists of two sets of four-cylinder triple-expansion engines on the wing shafts, which exhaust into a low-pressure turbine on the centre shafts. The i.h.p. of the combination is about 16,000, and the speed will be about 18 knots.

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton.—The s.s. *Towy*, the first of the three small cargo and passenger steamers for the Royal Mail Steam Packet Company, which was launched on the 26th February, is now rapidly approaching completion. The official trial will have been run by the time these notes appear in print. The work on the other two vessels is proceeding rapidly and the coastguard vessel for the Admiralty is making satisfactory progress. The ss. *Courier* was hauled up on the slip last month for survey. There is a great dearth of riveters at the port at present, which is preventing progress of work from being made as rapidly as it might be.

Messrs. J. Samuel White & Co., East Cowes, I. of W.—At the time of writing, H.M.S. *Liberty*, the last of the two torpedo boat destroyers built to the 1912-13 programme, had completed official trials and was ready for handing over. The *Almirante Simpson*, the third of the six destroyers ordered by the Chilean Government, was successfully launched on the 26th February, and is now receiving her machinery. Several small steam and motor pinnaces have been delivered and the engine works have a number of large sets of Diesel engines in hand.

Messrs. J. I. Thornycroft & Co., Ltd., Southampton.—This firm continue busy in all departments with the following work:—H.M. torpedo-boat destroyers *Porpoise*, *Unity*, *Victor*, *Lance*, *Lookout*, *Meteor* and *Mastiff*. The *Porpoise* has been delivered and the *Unity* will be handed oper early this month. The Canadian customs cruiser *Margaret* has successfully completed her trials and has left for Canada. Good progress is being made with the twin-screw tugs for the Argentine Navy. A number of motor boats have completed their trials during the past month and several have been delivered. A considerable amount of general engineering work has gone through the shops in addition to the machinery for vessels in hand. The repairs department has been very fully occupied with work on vessels of various types. The steam yachts *Atalanta* and *Lantava*, H.M.S. *Isla*, P.S. *Worthing Belle*, s.s. *Eggesford*, *Rosalin* and *Ludgate* are in hand for general repairs.

THAMES.

(From our Own Correspondent.)

Shipping Companies.—The Royal Mail Company has come into the market with an issue of £700,000 5 per cent. Debenture stock at 101 per cent. This stock forms part of an authorized issue and ranks subject to and immediately after the 4½ per cent. Debentures, which are not to exceed two-thirds of the paid-up capital of the Company for the time being. The combined fleets of the Company, and of the two shipping companies of which the Company holds all the shares, consists of 110 steam vessels, with an approximate tonnage of 678,270 tons, whilst the fleets of other companies affiliated to the Royal Mail represent a further tonnage of 950,513 tons. For 1912 the dividend on the ordinary stock was 6 per cent.

At a meeting of Lamport & Holt, Ltd., held at 36, Lime Street and presided over by Sir Owen Philipps, a dividend of 8 per cent. was recommended on the ordinary shares, the best since the Company was founded sixty-nine years ago. £100,000 was added to the reserve fund. The Company's fleet consists of thirty-six steamers, aggregating over 200,000 tons. The capital of the Company is increased to £2,000,000 by the creating of 500,000 new preference shares and the same number of new ordinary.

Port of London.—The authority has issued figures which go to show a large increase in the tonnage using the port during the first nine months of the year 1913-14. Of the tonnage paying river dues there is an increase of 2,239,182 tons and of the tonnage using the docks an increase of 1,213,658 tons. The latest returns seem to point to a continuous increase in the river dues and there is therefore a justification for the Authorities' position. The King and Queen have lately paid a visit to the Docks. The Cutler Street warehouses and the London Docks were visited by the Royal party, who were highly interested in the valuable objects that are stored here.

Chamber of Shipping.—This body has held its annual meeting in London and the president, Mr. J. H. Warrack, took occasion to note the decline in rates that seems imminent. While the last two years have been the best the trade has ever had he said there were signs of weakening attributed partly to a shrinkage in carrying requirements. Freights had decreased and there had been an increase in expenses all round. The Trades Dispute Act of 1906 was very much denounced. The dinner in the evening at the Whitehall Rooms was largely attended.

The New Training Ship.—The vessel lent to the Marquis of Northampton as a training ship left Chatham recently, towed by two Admiralty tugs for her berth at the Temple. The vessel, as the *Sharpshooter*, was one of the earliest torpedo gunboats built for the Navy.

Yacht Racing Association.—This body recently held its annual meeting at the Langham Hotel.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

THE King has taken an active interest in the many industries of the Lancashire and Cheshire districts This has been added to by his visit to the famous works of Lever Bros., Port Sunlight, and the shipbuilding works of Messrs. Cammell, Laird & Co. on March 25th.

Messrs. Cammell, Laird & Co.—On March 14th the *Karmala* was launched from this builders' yard for the P. & O. Co., the christening ceremony being performed by Mrs. F. Ritchie, wife of the P. & O. managing director. This vessel, like the *Kyber*, which has recently been handed over to the owners, will be delivered before contract time. The *Kalvan*, now on the stocks, will, it is expected, also be delivered ahead of time. The *Cuidad de Buenos Aires* will be launched ere this is in print for the Argentine Navigation Co., and together with a sister ship, also on the stocks, will be fitted up in most luxurious style and will be propelled by means of geared turbines driving twin screws. The Canadian train ferry is making good progress in the fitting-out basin, whilst the two sets of machinery for the light cruisers *Caroline* and *Cleopatra* are keeping the engine and boiler shops busy. At the annual staff dinner held at the Bear's Paw Restaurant, Liverpool, on March 14th, Mr. G. J. Carter, managing director, who was in the chair, remarked upon the fact that the past year's working had been very satisfactory, and also predicted a continued busy time. He also congratulated the firm upon an absence of strikes and hoped such a happy state of things would continue. Their Majesties visited the yard at about four o'clock on March 25th and were escorted through various departments by Mr. W. L. Hitchen, chairman of directors, and Mr. G. J. Carter, managing director. The repair department has been well employed with general survey and repair work.

Messrs. H. & C. Grayson.—At the Garston yard of this firm the large lightship on order for the Trinity House Authority is ready for launching as we go to press. Messrs.

Grayson have constructed many vessels of this type, and have unrivalled facilities for all classes of new and repair work.

Mersey Harbour Facilities.—The means of transport between the Lancashire and Cheshire sides of the river have been of late receiving careful attention. Several schemes have been proposed, including a high-level bridge, a similar tunnel to the existing Mersey tunnel with branches to Birkenhead and Seacombe, also the speeding up and improving of the ferry services. Still another scheme has been outlined by Mr. T. Downie, M.I.E.S., a well-known engineer of Liverpool, which proposes the electrification of the Wirrall railway and the construction of two new tunnels, one between New Brighton and Seaforth, the other from the Mersey railway terminus at Rock Ferry to Dingle on the Liverpool side, thus linking up the existing railway systems.

The Mersey Docks and Harbour Board are now proposing to add to the length of the landing stage considerably to the northward, by making use of the now almost disused cattle landing stage south of the Prince's Dock entrance. It is proposed to accommodate the cross-channel service by means of a deep water dock available at all states of the tide.

Cunard Line.—On the last eastward passage at time of writing the *Lusitania* beat all previous records by covering 618 knots in 23 hours as against 614 knots in a similar time covered by the *Mauretania*. This gives a speed of about 26·7 knots. It may be of interest to note that the *Aquitania*, which makes her maiden voyage from Liverpool on May 30th, has a length of 901 ft. with a beam of 97 ft., her tonnage being about 47,000.

White Star Line.—The *Britannic*, which was launched on February 26th at Belfast, while being one foot shorter than the *Aquitania*, *viz.*, 900 ft., will have a tonnage of 50,000 against 47,000 of the Cunard flyer. The White Star Line are at present reported to be discussing with Messrs. Harland & Wolff plans for a steamer of 30,000 tons.

The Wallasey Ferries.—The whole fleet of these ferry steamers have now been equipped with buoyancy seats of an approved pattern and lifebuoys to accord with the new Board of Trade regulations. These vessels are also retaining their original life-saving appliances.

Canadian Pacific Railway.—This company are now negotiating, we hear on good authority, with the Canadian Government for an improved Atlantic and Pacific service of steamers. This will involve the building of faster steamers and increased subsidy. There is talk of reducing the passage between Yokohama and Vancouver by twelve hours. The *Empress of Asia* recently covered the 4,300 miles between the former port and Victoria, B.C., in nine days five hours on her first trip.

The Georgian Bay Canal.—A matter of vital importance to vessels and owners of this port concerned with the grain traffic from the Great Lakes is the probable construction of a ship canal from the Georgian Bay, Lake Huron, to a point in the St. Lawrence, near Montreal. A commission of the members has been appointed by the Canadian Government to consider the commercial possibilities of the undertaking. It is estimated that two days would be saved on the passage from the head of the Great Lakes to the ocean. The engineering features have already been gone into, the system favoured being the dam and lock principle, the length will be about 400 miles and the projected cost £25,000,000.

Liverpool University.—Prof. W. S. Abell and Mrs. Abell were, on March 12th, made the recipients of a handsome silver rose bowl suitably inscribed. The presentation was made by Mr. L. H. F. Young on behalf of the students of the engineering faculty upon Prof. Abell's vacating the University Chair of Naval Architecture, to assume the duties of chief ship surveyor of Lloyd's Register.

The Imperial Merchant Service Guild.—The 21st annual meeting of this guild was held in Liverpool on March 3rd, Capt. T. V. Walker, chairman of the Management Committee, being in the chair. Mr. T. W. Moore, F.R.G.S., secretary, in presenting the 21st annual report and balance sheet, stated that 2,865 new members had been enrolled during the year, whilst the income had been £11,000 and the reserve fund stood at £35,000.

The Liverpool Steamship Owners' Association.—Mr. C. Sydney Jones, of the Alfred Holt Co., has been elected to the chairmanship of this Association for the ensuing year. On the occasion of the King's visit to Liverpool in July, 1913, this Association organized the naval review held in the Mersey. The members owned at the end of the year just closed 4,563,902 tons of steam shipping, comprising 21 per cent. of the total British steam shipping afloat; 30 per cent. of those vessels were of 12 knots and upwards and 39 per cent. were above 5,000 tons.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The shipbuilding trade of Barrow remains very busy in all departments, and there is still great concentration to get forward all the orders on hand. The great concern of Messrs. Vickers, Ltd., is a perfectly busy hive. There is a deal of work going on in all branches, and fully 16,000 men are employed. Since the settlement of the wages difficulty the men have been very busy in building ships, engines or other parts of ships, and are likely to be kept well employed for a long time to come, as the contracts held represent very big orders, three of them at any rate totalling up to £2,000,000 each, and others totalling at very large sums of money. The work in progress has made great strides during the month, and builders are getting ready for a renewal of business so soon as expected orders have been booked. There is every prospect of a continuance of brisk trade in shipbuilding for some time to come.

Messrs. Vickers' Ltd.—The balance sheet of Messrs. Vickers, Ltd., has been issued during the month. The ordinary shareholders are to get a dividend of 12½ per cent., as compared with 10 per cent paid during the past five years. A higher dividend was expected last year, but the directors determined to make the distribution just the same as in the previous four years. They were very busy in increasing the business of the firm in other parts of the world, and do not yet seem to have reached the end of their tether in this respect. Last year, £740,000 was offered to the shareholders in the shape of new capital at 30s. per share, the premium of £350,000 going into the reserve fund. The distribution of profit this year will amount to £555,000, as against £350,000 in the previous year. A further increase of capital is now proposed of £110,000 in £1 shares at 28/- each, which will give the shareholders a bonus of 12½ per cent., the ordinary shares standing at 39/6. £300,000 has been added to the reserve fund, compared with £200,000 last year, and this, with the works' extension fund of £200,000, makes a reserve fund of £1,070,000. The report is considered a very satisfactory one, as a concern with above a million in its reserve fund, and with a distribution of a dividend of 12½ per cent., is in an undoubtedly strong financial position. The new capital required will be used largely in connection with the branch concerns which have been established in many parts of the world, and all of which may be expected to help to swell the profits of the parent firm. It is interesting to note that the firm have now branch establishments in Spain, Canada, the Argentine, Italy, Russia and Turkey, and who shall tell how many more will eventuate in the early future.

Work in Hand.—The greatest possible activity is to be found on the Turkish battleship *Reshadieh* and the British super-Dreadnought the *Emperor of India*, both of which vessels are needed for the earliest delivery possible. Probably more than 4,000 men are employed on these ships and in the works in getting machinery, etc., ready to be fitted on board. There are hopes that the *Reshadieh* will be ready for delivery to the Turks in the early autumn, and it is expected the *Emperor of India* will be completed by the end of the year. Great strides have been made with the work of constructing H.M.S. *Revenge* on the shipbuilding side of the works, and she is now assuming a very big size on the stocks. There has also been great attention devoted to the building of the two light cruisers *Phaeton* and *Penelope*, one of which will be ready for launching shortly. Great activity is shown in the submarine department, where many orders are in progress for the British Admiralty. Before long the new experimental submarine building for the British Navy will be ready for launching. She will be the largest

and most powerful submarine yet built, and contains many improvements in construction and speed which will place her much in advance of any submarine yet designed. She will have enormous fighting power, and will contain many improvements not contained in any sub-aqueous vessel yet built. The *Olympia*, the 8,000 tons oil-tank steamer building for the Admiralty, is making good progress, and it is expected about midsummer she will be ready to take the water. One of her two oil engines has been built and is now running very satisfactorily in the shops. The other engine is almost ready for her shop trials. The firm of Messrs. Vickers have made a great success in their very long experiments with heavy oil engines, and later on we may expect to hear of their successful operations in the propelling of large ships of war and of commerce. The work of building the new section of the big floating dock now at Rio de Janeiro is showing signs of getting on, and it is expected that this year she will be delivered and fitted to the existing dock, making her capable of lifting even larger and longer vessels than the *Minas Geraes* and the *St. Paulo*, the two Dreadnoughts built by the Armstrong and the Vickers' firm,

Russian Armaments.—There has been some talk of the Duma not having been considered by the Ministry of Marine in the contract entered into by the Russian Government, and it is claimed that Messrs. Schneider, of Creusot, can build larger guns than Messrs. Vickers, while the contrary contention is also being used. The question at the moment is in abeyance.

Strikes.—A strike at the Barrow shipyard on the question of caulkers being allowed to do certain work claimed to be the work of the engineers, has been settled by the men being induced to go back to work, while the question will be fought out by a combined committee. A strike at the Turkish shipyard at Constantinople, now being worked by Messrs. Vickers and Messrs. Armstrong, on the question of conditions of labour, has been satisfactorily settled, and the men have returned to work.

BELFAST.

(*From our Own Correspondents.*)

State of Trade—Every slip in the Belfast shipyards is occupied, and immediately a vessel is launched the ways are cleared away without an hour's delay to enable another keel to be laid at once. At present there are afloat at the fitting-out wharves steamers with an aggregate of close on 100,000 tons gross. Repair work is also brisk, there being nearly 30,000 tons undergoing overhaul and repairs.

Messrs. Harland & Wolff launched the big White Star liner *Britannic* on 26th February. A full description of the event and of the vessel herself appeared in the March issue of "The Marine Engineer and Naval Architect," so that it is not necessary to add anything further in this connection here. The *Britannic* was immediately berthed at the deep-water wharf, where she now lies having her machinery fitted on board. Messrs. Harland & Wolff are reported to have received a further order from the White Star Company for a vessel of about 30,000 gross tonnage. In addition to the *Britannic* the Queen's Island firm have at the fitting-out wharves the Royal Mail Steam Packet Co.'s new mail and passenger liner *Alcantara* and the *Euripides*, launched at the end of January, for Messrs. George Thompson & Co.'s Aberdeen Line. Messrs. Harland & Wolff are still greatly handicapped for want of men, and a good deal of their work has in consequence got behind. A considerable amount of overtime is being worked in the yard and on vessels fitting out. As regards the engine works a night shift has been run there almost continuously for upwards of twenty years. They are still engaged on the extensive overhaul and alterations on the Atlantic Transport Co.'s *Minnehaha* and the Lamport & Holt liner *Voltaire*. The latter vessel is at present in graving dock.

Messrs. Workman, Clark & Co. are extremely busy, and they too are suffering from the dearth of riveters and platers. On 7th March they handed over, after a successful trial trip, the Royal Mail Steam Packet Co.'s new steamer *Carnarvonshire*, and are now busy with the fitting out of the *Star of England*, which is the latest addition to Messrs. Corry's Star Line; and *City of Vienna*, built by them for the Ellerman Line. The former vessel will be ready for sea in a week or two. The *City of Vienna* was launched from the south yard on 17th March. The launch of this steamer was a somewhat noteworthy event in view of the fact that she is the first having a cruiser stern to be put into the water in Belfast. They have several other vessels with this design under construction, including two further steamers for the Ellerman Line. In this connection it may be mentioned that two steamers building on the Queen's Island also have this type of stern. It is quite evident that the cruiser stern is "catching on," notwithstanding that there has been considerable controversy regarding the advantages claimed for it. In the way of repairs Messrs. Workman, Clark & Co. have in hand the Irish Shipowners Co.'s *Lord Roberts* and the Ulster Steamship Co.'s *Teelin Head*.

The Harbour.—The Harbour Commissioners are pushing on with the foundations for their new crane. The collapse of the old crane was a disaster that has greatly handicapped Messrs. Workman, Clark & Co., as they can only get the use of Messrs. Harland & Wolff's big floating crane at such times as the latter are not using it themselves.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff, Barry and Newport.

THROUGHOUT the past month the ship-repairing establishments of the Bristol Channel have been well employed, and at the time of writing special activity is noticeable, which may be attributed to the heavy gales prevailing here during the past week. After bad weather in the Channel a crop of damage repairs invariably turns up and provides employment for the dry dock owners as well as for the smaller firms engaged in dealing with ship repairing. At present a large number of minor damage repairs are being dealt with in the wet docks, while some of the more serious cases will probably be put up for competition, and in this connection it may safely be assumed that they will be dealt with in this district, where special equipment for dealing with work of this description exists. Very seldom does any repair work leave this port for another part of the country, the most recent examples of the latter contingency being the case of the steamer *Silver Wings*, which was driven ashore near Barry during a strong gale, and which, after refloating, was placed in one of the Cardiff dry docks for examination. When the repair work was subsequently submitted to competition a North-east Coast firm was successful in securing the contract. The work involved is extensive and means the practical renewing of half the bottom of the ship.

Mountstuart Dry Docks, Ltd.—The works and docks of this Company have been kept busy without a break during the last two months, forty-five steamers having been dry-docked and a large number of vessels repaired afloat. Collisions accounted for two heavy jobs, *viz.*, the *Demetian* and *Gogovale*. The extensive repairs on the *Waverley* and *Julia Park* have been brought to a completion. Among the more extensive repairs may be mentioned the work executed on the *Countess Warwick*, *Glenartney*, *Norman Monarch* and *Oldfield Grange*.

The Channel Dry Dock and Pontoon Co. and its various associated concerns in the Bristol Channel ports have been actively engaged for some time past, but, like all other firms, have experienced an increase of activity during the latter part of the past month. Among the work dealt with may be mentioned general repairs to the steamers *Haddon Hall*, *Kreta*, *Panaghi*, *Vagliano*, *Ellaline*, *Armadale*, *Rokos*, *Tyr*, *Mariston*, *Kish*, *Epsom*, *Ross*, *Norfolk*, *Aysgarth*, *Strombus*, etc.; also collision damage to the steamer *Carolvore*, a number of the jobs being of the heavy repair order. This firm, controlling as it does a number of docks and pontoons in various ports, is in a position to deal with a large volume of work.

Hill's Dry Dock and Engineering Co. continue to be steadily employed, and recently executed extensive repairs to the steamer *Wheatlands*, about thirty bottom plates having to be renewed as a result of the trade in which the steamer is engaged. Other repair jobs dealt with included the steamers *La Bayonnaise*, *St. Marc*, *Snowdon*, etc.

Junction Dry Dock Co. were engaged on heavy repairs to the *Princess Thyra*, and general repairs to the *Eddie*, *Gena*, etc.

Messrs. T. Diamond & Co. secured the execution of the repairs to the *Woodlands*, sustained in collision with the *Pontypridd* in the Bristol Channel.

Messrs. Elliott & Jeffery dealt with a steady volume of general repair work and continue to be well employed.

At Barry the dry docks and repairing establishments were exceptionally well engaged and the outlook at the time of writing is rosy.

The Graving Dock Co. executed general repairs to steamers *Glenspean*, *Penmorvah*, *Kirkswald*, *Etolia*, *Ethelhilda*, *Wimbledon*, *Oakfield*, *Irelissick*, etc. as well as general docking work.

Messrs. C. H. Bailey have been consistently fully employed and have had the execution of several heavy damage repairs, more prominent among these being the collision damage to the steamer *Darwin*, which collided recently off Beachy Head with a Ropner steamer. This job included the insertion of a new stem bar, about thirty bow plates, besides a number of frames and deck plates. There was also extensive bottom damage to the steamer *Maritime*, and collision damage to the *Teeswood*. In addition to the above, general repairs have been executed on the *Essex Abbey*, *Agenoria*, *Persiana*, *Llongwen*, *Drumloist*, *Redesmere*, *Wolverton*, *Albiston*, *Borrowdale*, etc.

Sunken Pilot Steamer.—The Cardiff steam pilot boat, *W. W. Jones*, while engaged on her duty of placing pilots on board inward-bound ships recently, was unfortunate enough to sustain such damage in collision with the Cardiff steamer *Lavernock* as to result in the pilot boat sinking. The salvage was undertaken by the Cornish Salvage Association, and the sunken craft has now been raised and is at present undergoing the necessary repairs in the Cardiff Docks, to enable her to return to her station at an early date.

Newport Entrance Lock.—This new lock, the largest of its kind in the world, is approaching completion, and is expected to be ready for use during the summer. The lock is 1,000 ft. in length and 100 ft. in width, and in order to make it available for the large ships which its dimensions will undoubtedly attract, a deep entrance had to be provided. The enterprise of the Newport dock authorities in endeavouring to make their docks suitable for the most modern class of ship is to be commended, and it is to be hoped that the increased facilities provided in the docks for loading ships may be fully made use of when completed.

Port Talbot Docks.—In order to cope with the ever-increasing traffic at these docks the Company are engaged on extensive improvements, which include wharf extensions, coal-shipping apparatus, etc. The belt conveyor for coal-tipping has now been completed for use, and two other conveyors are at present under construction, one being fixed and one movable, so that loading may be continued fore and aft simultaneously without the loss of time consequent on moving the ship. A similar arrangement of movable coal tips of the ordinary type exists at one part of Barry Dock, but the belt conveyors under construction at Port Talbot are the first of their kind in the Bristol Channel, and it is claimed for them that they reduce the risk of breakage of coal to a minimum. The wharf extensions are all being executed in ferro-concrete and will be furnished with heavy hydraulic cranes to deal principally with the traffic from the Port Talbot steel works. A new entrance lock parallel with the existing one will also be made and will be 875 ft. long by 90 ft. wide, and is to be provided with three pairs of lock gates, so as to divide it into two independent locks when occasion demands. In order to provide electric power for the various additions a new electric power station is being erected, and will be arranged to provide facilities for future extension.

FOREIGN NOTES.

Denmark.

The motor ship *California*, built for the United Steamship Co., at Copenhagen, at the Burmeister & Wain shipyard, is of the same dimensions as the steamship *Maryland*, which has been built at the Tecklenborg shipyard. Both vessels will run on the North American service and their respective system of propulsion be tested by practical results

France.

The well-known firm of Creusot has acquired the Du Temple shipyard at Cherbourg, which it intends to considerably enlarge at once and to employ about 2,000 men.

The twin-screw steamer *Asie*, in course of building at the Chantiers de France, at Dunkirk, for the Chargeurs Réunis Co., is to be employed on the West African and Congo Service. Her length is 459 ft., greatest beam 55 ft., moulded depth 39 ft. and displacement 12,000 tons. The propelling machinery consists of two triple-expansion engines, and the speed of the vessel will be 16 knots. The Admiralty has placed an order for a powerful steam tug of 1,500 i.h.p. with a French shipyard at Bordeaux, for the port of Toulon. It will be employed in salvage work in connection with wrecks, and will be equipped with all modern apparatus used for this purpose. The mail steamer *Porthos*, built in the dry dock of the Chantiers Gironde, to the order of the Messageries Maritimes, has become waterborne. The vessel, which will take up the Marseille-Haiphong mail service, is 528 ft. in length, and her displacement is 18,000 tons on a draught of 27 feet. She is being equipped with two triple-expansion engines developing 9,000 i.h.p. and will have a speed of 16 knots. Accommodation is provided for 400 passengers. The twin-screw mail boat *Haiti*, owned by the General Transatlantic Co., has entered into service to the West Indies. Her dimensions are :—Length 428 ft., greatest beam 51 ft., displacement 8,500 tons on a draught of 20 feet. Her propelling machinery of the triple-expansion type developed 4,500 i.h.p. on her trials, and a speed of 16 knots, somewhat in excess of the contract speed was attained. The cargo steamer *Saint Michael*, launched at the Chantiers de France on the 14th January, and built to the order of the Société de l'Ouest, has now been through her trial runs, which were completely successful, the vessel easily attaining the contract speed of 14 knots. Her length is 354 ft., beam 52 ft. and her carrying capacity 7,700 tons. Her engine develops 2,500 i.h.p.

Germany.

The cargo steamer *Therese Horn* has been successfully launched at the Koch shipyard, where she has been built to the order of the firm of H. C. Horn of Schleswig. Her dimensions are :—Length 374 ft., beam 50 ft., and her carrying capacity of a 22 ft. draught is 6,800 tons. Her engine will develop 2,000 i.h.p. and impart a speed of 11 knots to the vessel.

The cargo and passenger steamer *Anhalt*, built at the Bremen Vulcan shipyard at Vegesack to the order of the North German Lloyd at Bremen for their Australian service, has been launched. Her length is 489 ft., greatest beam 56 ft. and the carrying capacity is 11,000 tons on 26 ft. draught. Her steam engine developing 4,500 i.h.p., will give her a speed of 12·5 knots.

The cargo steamer *Frankenfels*, built at the Weser-Bremen shipyard to the order of the Hansa Steamship Company of Bremen, has been successfully put through her trial runs, the vessel attaining a speed of 11·5 knots. The Schichau shipyards at Elbing and Dantzig have at present twenty-nine steamers, with a total of 145,200 tons and 365,000 i.h.p. in course of construction, which are all to be delivered during the present year.

The cargo steamer *Camilla Rickmers*, 8,000 tons carrying capacity, has been launched by the Rickmers shipyard at Bremerhaven-Geestemünde, where she has been built to the order of the Rickmers Steamship Company, for general cargo purposes. Her length is 416 ft., beam 29 ft., and her propelling machinery is designed to develop 2,000 i.h.p., giving her a speed of 12 knots.

The *Maryland*, a cargo and passenger steamer of 8,200 tons carrying capacity, built to the order of the Foreign Steamship Co., at Copenhagen, has just been put through her trial runs by the Tecklenborg shipyard. Her length is 420 feet, beam 55 ft. and with her engine developing 2,500 i.h.p. she attained the contract speed of 14 knots.

The cargo steamer *Baden* completed her trial runs recently, her engine developing 3,700 i.h.p. and giving the vessel a speed of 12 knots. The length of the *Baden* is 485 ft., beam 58 ft., and on a draught of 26 ft., she has a carrying capacity of 12,400 tons. The vessel has been built at the

Bremen Vulcan Co., at Vegesack, for a German Shipping Company at Bremen.

The *Vaterland*, the ocean liner in course of construction to the order of the Hamburg-Amerika Line, is being rapidly completed and will start on her maiden voyage from Hamburg to New York on the 4th June.

The Reiherstieg Shipyard and Engineering Co. has received an order for a cargo steamer of 6,000 tons carrying capacity from the Harburg Woermann Line for the African service.

The *Kigoma*, twin screw cargo and passenger steamer, built at the Reiherstieg Shipyard to the order of the East African Line, has just been launched. Her dimensions are :— Length 447 ft., beam 55 ft., carrying capacity 7,150 tons on a draught of 25 feet. Her speed will be 14 knots and she will have accommodation for 388 passengers.

The cargo steamer *Wurtenberg*, built at the Bremer Vulcan yard, has been successfully put through her trial runs, when she attained the speed of 12 knots. Her length is 485 feet, beam 58 ft. and she has a carrying capacity of 12,400 tons on a draught of 27 ft.

The cargo and passenger steamer *Johann Heinrich Burchard*, built at the Tecklenborg shipyard for the Hamburg-Amerika Line has now been launched. Her length is 612 ft., greatest beam 71 ft. and on a 27 ft. draught her displacement is 23,650 tons. She is provided with two triple-expansion engines of 4,500 i.h.p. each, an exhaust steam Parsons turbine of 6,000 b.h.p. and fourteen water-tube boilers. She will be able to accommodate 300 passengers first-class, 175 second, 132 third and 850 between-deck passengers. She is intended for the La Plata service.

Holland.

The cargo and passenger steamer *Sloet van de Beele* has now been launched at a Rotterdam shipyard, for the Royal Steamship Co., Rotterdam. She will be employed in the mail service and has a speed of 11·5 knots.

The cargo and passenger steamer *Roshi* for the transport of pilgrims was launched at the Scheepsbouer shipyard at Amsterdam for the Stromcaart Co., at Amsterdam. Her length is 470 ft., beam 56 ft. Her engine will develop 5,150 i.h.p. and a speed of 13½ knots is contracted for.

Italy.

The Admiralty has placed an order with the shipyard of A. F. Smulders at Schiedam for a salvage vessel for submarines. It will be equipped with two compound engines of 800 i.h.p. and is to travel to Spezia by its own power. Its length is 165 ft., beam 77 ft. and its total lifting power is to be about 400 tons from a depth of 196 ft., exercised by two cranes of 200 tons each. These cranes can be moved from 39 ft. to 59 ft. distance from each other to suit the length of the submarine to be lifted.

Russia.

The Russian Register Society has now been confirmed by the Minister of Commerce and will commence the business of classifying ships. It has been founded by shipyards and shipping firms and has for its object, also, the supervision, and not only the classifying of vessels of the Mercantile Marine. The Society will also issue a registration publication and building conditions.

Spain.

The new fleet programme includes three battleships of 21,000 tons, two small cruisers of 3,000 tons, six destroyers of 700 tons, eight submarines of 400 tons displacement, besides several auxiliary craft.

Turkey.

It is reported that a programme is being prepared by the Turkish Government for a considerable extension of the fleet by the construction of several large and small units, and it is also intended to equip an arsenal and shipyard with docking facilities for the use of the future warships.

U.S.A.

Tenders have been received for the construction of two coaling vessels, for the transport of coal to Panama, which are to be equipped as auxiliary cruisers. The length of each vessel is 500 ft., beam 62 ft., draught loaded 27 ft., and the speed 14 knots. It has been decided to construct eight submarines and one of these is to be of a new large type with surface speed of twenty knots.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.

AYDON. Launch, March 12th. Steel screw steamer, built to the order of Jas. E. Tully, Esq., Newcastle-on-Tyne. The vessel measures 265 ft. by 38 ft. 3 in. by 19 ft. 6 in. moulded, and has been constructed under special survey for Lloyds' highest class. She is of the raised quarter deck type, with long poop, short bridge and topgallant forecastle and is specially adapted for the coal and wood trade, with a thoroughly up-to-date equipment of deck machinery. A large water ballast capacity is also provided. Electric lighting has also been installed throughout the ship. Triple-expansion engines of good power will be fitted aft in the vessel and will be supplied by the North Eastern Marine Engineering Co., Ltd., Sunderland. During construction the hull and machinery have been under the supervision of Messrs. Jos. R. Scott & Son, Newcastle-on-Tyne.

Craig, Taylor & Co., Ltd., Stockton-on-Tees.

CORNELIS. Launch, March 13th. Single-deck screw steamer built to the order of A. C. Lensen, Esq., of Terneuzen, under the superintendence of Mr. W. C. Carter, A.M.I.C.E., M.I.N.A., consulting engineer, of London. Dimensions, 306 ft. by 45 ft. by 22 ft. 6 in. moulded. Built of steel to the highest class in Lloyd's Registry, under special survey, and has poop, bridge and topgallant forecastle ; water ballast in double bottom fore and aft and in peaks. She is equipped with patent steam windlass with quickwarping ends, steam-steering gear, five steam winches, and suitable donkey boiler ; telescopic masts, etc. The engines have been constructed by The North Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 21½ in., 36 in., 59 in. by 39 in., with two large steel boilers working at 160 lbs. pressure. In addition to general trades, the vessel is also specially adapted for timber carrying. This is the ninth vessel which Messrs. Craig, Taylor & Co., Ltd., have built for the same fleet.

William Doxford & Sons, Limited, Sunderland.

ROMAN PRINCE. Trial Trip, February 27th. This vessel which has been built to the order of the Prince Line Limited, Newcastle, ran a successful sea trial, when a speed of 13¾ knots was attained. For Launch, see February issue.

Sir James Laing & Son, Ltd., Sunderland.

TEUTONIAN. Launch, February 25th. Built to the order of the Petroleum Steamship Company, Ltd. (Messrs. Lane & Macandrew, of London, managers) for the carriage of oil in bulk. Dimensions :—Length b.p. 374 ft., breadth moulded 50 ft. 6 in., depth moulded 29 ft. 5 in. She will carry about 6,700 tons deadweight. The engines, which are of the triple-expansion type, are being constructed by Messrs. John Dickinson & Sons, of Sunderland, and have cylinders 26 in., 44 in. and 72 in. by 48 in. stroke supplied with steam from three large single-ended boilers of ample power working at a pressure of 180 lbs. The pumping arrangements are of the latest description and the vessel is fitted with three large cargo pumps. The bunkers are constructed both for coal and oil fuel. Both the hull and machinery have been constructed to Lloyd's highest class under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

ELFLAND. Launch, March 11th. This steamer, which is constructed to carry 7,500 tons, has been built to the order of Messrs. Fred Drughorn, Ltd., for general cargo. Her principal dimensions are :—Length 370 ft. b.p., breadth 51 ft. and depth 28 ft. 9 ins. She will be propelled by machinery constructed by The North Eastern Marine Engineering Co., Ltd., of Sunderland, having cylinders 25 in., 41 in. and 69 in. by 48 in. stroke. The engines are supplied with steam by three large cylindrical multi-tubular boilers working at 180 lbs. per square inch. The vessel and her machinery have been constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam, to Lloyd's highest class under the single deck rule.

Osborne, Graham & Co., Sunderland.

GYULA. Trial Trip, March 14th. Steel screw steamer built for Mr. F. Camilli, of Paris, was sent to sea for the

official trial trip on this date. She carries 1,650 tons on a very light draught and has been built to Lloyd's highest class. Machinery of large power has been supplied by Geo. T. Grey, of South Shields, and on the trial everything was satisfactory, the contract speed being easily exceeded.

Palmers' Shipbuilding & Iron Co., Ltd., Jarrow-on-Tyne.

SAN MELITO. Launch, March 12th. Oil tank steamer, one of the ten large vessels constructed on the North-East Coast to the order of the Eagle Oil Transport Company, Ltd., of London. The *San Melito* is the second of two sister ships for the same owners constructed by the Palmer Company at their Jarrow shipyard, the first vessel, the *San Hilario*, being delivered last year. The vessel has an over-all length of nearly 550 ft., and she will carry a total deadweight of over 15,000 tons. She is constructed on the Isherwood system of longitudinal framing, to Lloyd's highest class for the shelter-deck type. The shelter 'tween deck will be empty when oil cargoes are carried, and is arranged for exemption from tonnage measurement. The oil is carried in twelve main compartments, sub-divided by a centre longitudinal oil-tight bulkhead, having the usual cofferdams. The vessel is primarily intended for the carriage of liquid fuel, but benzine and other light oils can be carried if required. The machinery, also constructed by the Palmer Company, comprises a set of quadruple-expansion balanced engines, steam for which is supplied by four large single-ended boilers, arranged for burning liquid fuel, and working under forced draught at a pressure of 220 lb. per square inch. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" solution has been applied throughout the boiler-room tank and their patent "Bitumastic" covering to the tank top.

Wm. Pickersgill & Sons, Ltd., Sunderland.

EIBERGEN. Launch, March 12th. Single-deck steamer built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for The Naamlooze Venootschap Furness' Scheepvaart en Agentuur Maatschappij, Rotterdam. The vessel has been built under special survey to take the British Corporation's highest class and her dimensions are: Length 391 ft., breadth 52 ft. 3 in., depth 29 ft. 6 in., with a cargo carrying capacity of over 8,200 tons. She is fitted with cellular double bottom throughout for water ballast and the peaks are also fitted as ballast tanks. She is being built with a special view to rapid loading and discharging of cargo and is fitted with five large hatches, each of which is worked by double derricks fitted on mast tables, with outriggers at mast head, and full complement of derrick posts. She is to be rigged as a two-masted schooner, with steel lower masts and wood telescopic topmasts, these being specially strengthened to enable them to take 25 ton lifts. Ten powerful steam winches are being supplied and a special quick-warping windlass of the latest type. The steam-steering gear is fitted in house amidships abaft engine room and controlled by rods and bevelled wheels from flying bridge. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" enamels have been applied throughout the bunkers, engine and boiler-room tanks, bilges, etc., and their patent "Bitumastic" covering to the tank tops. The vessel is specially arranged with a view to carrying large deck cargoes in accordance with the requirements of the Dutch Government. The machinery and boilers are being supplied by Messrs. Richardsons, Westgarth and Co., Ltd., of Sunderland, the cylinders being 25 in., 40 in. and 68 in., with stroke of 48 in., and steam will be supplied by three large boilers built of steel with a working pressure of 180 lbs. During construction the vessel has been under the supervision of Mr. D. Ross, the owners' superintendent.

John Readhead & Sons, Ltd., South Shields.

ROSEMOOR. Launch, February 26th. Steel screw steamer of improved single-deck type, built to the order of the Novocastrian Shipping Co., Ltd., Newcastle-on-Tyne (Messrs. W. Runciman & Co., managers). Classification—Lloyd's highest class and under their special survey. Dimensions—381 ft. by 51 ft. by 27 ft. 8½ ins., with poop, extra long bridge and topgallant forecastle. Fitted throughout with shifting boards and grain feeders in compliance with the requirements of the Grain Loading Act. A double bottom is provided for water ballast, as well as a large after peak tank. Triple-expansion engines will be fitted, constructed by the builders of the vessel, having cylinders 26 in., 42 in. and 69 in. with 48 in. stroke, steam being obtained from two large steel boilers of 180 lbs. working pressure. There is also a large marine type donkey boiler. She has been constructed under the supervision of Mr. W. P. Henry and Mr. N. Blatchford, owners' superintendents, and is the twenty-fourth vessel built for Messrs. Walter Runciman & Co. by the above firm.

NEWQUAY. Trial Trip, February 27th. The screw steamer built and engined by Messrs. John Readhead & Sons, Ltd., to the order of Messrs. J. J. and C. M. Forster, Newcastle-on-Tyne, was taken to sea on her official trial trip, which proved in every way satisfactory and successful to all concerned. The vessel afterwards proceeded to Newport under the command of Captain Upson, to load for Buenos Ayres. For Launch, see February issue.

Short Bros., Ltd., Sunderland.

MOORISH PRINCE. Launch, February 26th. Built to the order of The Prince Line Limited, of Newcastle-on-Tyne Leading dimensions are:—Length 440 ft., beam 56 ft. 4 in. and depth moulded 30 ft. 7½ in.; she is fitted with two complete steel decks and a shelter deck, with promenade deck over the midship portion. Her deadweight will be about 9,300 tons on a moderate draught of water with fine model. Ample water ballast is provided in the double bottom, fore and after peaks, and deep hold tank to enable the vessel to make light passages with safety and despatch. The double bottom is also arranged for the carriage of oil fuel. The holds are sub-divided by eight watertight bulkheads and are free from obstruction, the decks being supported by strong girders and wide-spaced tubular pillars. Accommodation is provided in the forward deckhouse for twelve first-class passengers, with handsomely decorated saloon. Above this house a large house is arranged with smoking room and music room. Sixteen derricks are fitted on houses at masts with crosstrees above, and four derricks worked from Samson posts at cross bunker and deep tank hatches, in addition to a strong derrick lifting 30 tons which may be worked from either mast. Thirteen steam winches, steam windlass, steam-steering gear fitted in deckhouse aft and worked by telemotor from wheelhouse and flying bridge, and steam ash hoist with shoot are fitted, taking steam from a large multitubular donkey boiler fitted on main deck. The propelling machinery will be supplied by Messrs. R. Blair & Co., Limited, of Stockton-on-Tees, and consists of quadruple-expansion engines, with cylinders, 25½ in., 36½ in., 52½ in., and 76 in. diameter with a stroke of 54 ins., driven from three large multitubular boilers of 220 lbs. pressure. Howden's forced draught is fitted and the vessel is expected to maintain an economic sea speed of 11½ knots. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" enamels have been applied throughout the double bottom, bunkers, etc.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend.

VAN HOGENDORP. Launch, March 12th. Steamer designed for the carriage of fruit, and built to the order of Messrs. Wambersie & Zoon, of Rotterdam. The *Van Hogendorp* is the first of an important line of vessels to be run by the Atlantic Fruit Company to carry fruit from the West Indies and Central America to the continent of Europe. Messrs. Wambersie and Zoon are at present building three sister ships, and there will be others to follow, so that before long a weekly service will be maintained across the Atlantic. The *Van Hogendorp* is 343 ft. in length overall and 45 ft. in breadth. In the deckhouse amidships there is comfortable accommodation for thirty passengers, and on the navigating bridge the captain and officers are housed. The holds of the vessel throughout are insulated by granulated cork for the carriage of fruit. The triple-expansion engines, as well as the boilers fitted with forced draught, are being constructed at the Neptune Engine Works of Swan, Hunter & Wigham Richardson, Ltd. The ship and engines are being built in accordance with the requirements of Lloyd's Registry, as well as of the Board of Trade and Dutch Law.

Robert Thompson & Sons, Ltd., Sunderland.

BIARRITZ. Launch, February 26th. Single-deck cargo steamer, built to the order of Messrs. Plisson & Co. (Compagnia des Chargeurs Français), of Paris. Her principal dimensions are:—Length overall 310 ft. 2 in., breadth 44 ft. 6 in. and depth moulded 22 ft. 3 in. She takes the highest class at Lloyd's, and is built to fulfil all the requirements of the French Government regulations. Her construction is on

the deep frame principle with one deck, leaving the holds clear of all obstructions. The erections consist of bridge 90 ft., poop 25 ft. (both available for cargo if required), and forecastle. There are four large cargo hatchways, with derricks to each, also derrick posts to poop and bridge hatches, all worked by powerful steam winches, and a large multitubular donkey boiler of ample capacity to supply steam to deck machinery. Large and spacious deck houses are arranged on the bridge deck. The engines, by The North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 22½ in., 36½ in. and 60 in., with a stroke of 39 in., steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch. During construction the vessel and machinery have been under the personal supervision of the owners' superintendent, Mr. Duncan Buchanan, of Cardiff.

Tyne Iron Shipbuilding Co., Ltd., Willington-quay-on-Tyne.

ELBRUZ. Launch, February 26th. Twin-screw motor vessel built to the order of the Société Anonyme d'Armement d'Industries et de Commerce of Antwerp. The classification is high class and the dimensions are :—Length overall 390 ft., breadth extreme 51 ft. 3 in., depth 29 ft., she is designed to carry nearly 7,000 tons deadweight on Lloyd's summer draught. The vessel, which has been built for the purpose of carrying petroleum and other oils in bulk, is fitted with a very complete oil pumping installation, including oil pumps of large size for working against a heavy back pressure and a separate system of pipe openings for dealing with water only, so as to avoid the possibility of mixing with oil; she is also fitted with a complete system of steam-heating coils and fire extinguishing steaming out arrangements in each oil tank and each oil fuel bunker. The accommodation, which is much superior to the ordinary class of vessel, has been carried out to the special requirements of the owners, and includes a complete system of steam-heating electric light, voice pipes and bells; the crew have special wash houses, with baths and showers. The main engines are two six cylinder "Werkspoor" marine Diesel motors of their usual four-cycle single-acting type—the diameter of the cylinder being 560 mm., the stroke 1,000 mm. —the speed 125 R.P.M. and the output 2,200 B.H.P. (which will give a speed of 11½ knots when fully loaded), supplied by the Nederlandsche Fabriek van Wertuigen en Spoorwegmaterieel of Amsterdam, two large high-pressure boilers being installed in the engine room and arranged for liquid fuel firing—one for driving the auxiliaries in engine room and the other the oil and ballast pumps and deck machinery—including winches, capstan, electric light engine and steam-steering gear. The galley cooking range is heated by oil instead of coal, so that no coal whatever will be carried on the ship. A first-class wireless installation is fitted on the latest improved system with wide circuit. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" covering has been applied to the tank tops. During construction the vessel and machinery has been under the inspection of Capt. J. C. F. Muller, the marine superintendent for the owners. It is interesting to note that The North Eastern Marine Engineering Co., Ltd., of Wallsend, have constructed and sent to Amsterdam the bedplate, columns and cylinders for the main motor machinery. After the launch the vessel was taken to the works of this Company to receive her donkey boilers and air compressors and will ultimately be towed to Amsterdam to receive her motor machinery.

Wood, Skinner & Co., Ltd., Newcastle-on-Tyne.

SPRINGWELL. Launch, February 25th. A finely modelled steel screw steamer, designed for a loaded sea speed of 13 knots, built for The Well Line, Limited, Newcastle-on-Tyne (Messrs. Tyzack & Branfoot, managing owners) for their London and Calcutta service. The vessel is built with two complete steel decks, with poop, long bridge and topgallant forecastle. The saloon and cabin accommodation is arranged in a large steel deckhouse on the bridge deck. Accommodation is provided for a crew of eighty-two hands, the officers' and engineers' berths being in sidehouses on the bridge, petty officers and apprentices in the bridge 'tween decks and seamen and firemen in the topgallant forecastle. A large strong-room for specie is provided in the deckhouse. The principal dimensions of the vessel are: Length between perpendiculars 425 ft., beam 54 ft., depth moulded 33 ft., with very lofty 'tween decks. Large water ballast capacity is provided in the cellular double bottom all fore and aft and also in the fore and after-peak tanks. The vessel will be rigged as a fore and aft schooner with telescopic topmasts. She will be fitted with all the latest improvements and appliances for the rapid loading and discharging of cargo and general working and navigation, including fourteen derricks and a specially built lattice derrick for lifting thirty tons, eleven powerful steam winches, direct-acting steam windlass, steam-steering gear in engine room and complete electric light installation throughout. The vessel will also be fitted with a complete installation of wireless telegraphy. She is provided with all necessary fire-extinguishing apparatus, as well as being fully equipped with the latest appliances for the prevention of fire. The engines will be of the improved quadruple-expansion type, having cylinders 25½ in., 36 in., 52½ in. and 76 in. diameter by 54 in. stroke, supplied with steam by three large steel multitubular boilers working at a pressure of 220 lbs. per square inch, in addition to which a large steel multitubular donkey boiler, working at a pressure of 180 lbs., will be fitted for supplying steam to the deck machinery. The propelling machinery has been constructed and will be fitted by The North Eastern Marine Engineering Co., Limited, at their Northumberland Engine Works, Wallsend-on-Tyne. Both the ship and engines have been constructed to the requirements and under the special survey of Lloyd's for their highest classification, and have also been built to the specifications and under the supervision of Messrs. Thompson, Eyres & Bryers, of Sunderland. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" enamels have been applied throughout the bunkers, etc., and their Patent "Bitumastic" covering to the tank tops. On leaving the ways the vessel was very gracefully christened *Springwell*, by Mrs. Clive Branfoot, of Gosforth, Newcastle-on-Tyne.

TEES AND THE HARTLEPOOLS.

Wm. Gray & Co., Ltd., West Hartlepool.

ARNOLD MAERSK. Launch, February 26th. Steel screw steamer built to the order of A. P. Moller, Esq., Copenhagen, to take the highest class in Lloyd's Register, and of the following dimensions, *viz.* :—Length overall 290 ft. 6 in., breadth 40 ft., and depth 21 ft. 4 in., with long bridge, poop and forecastle. The hull is built with deep frames, cellular double bottom and large after and fore-peak ballast tanks, five steam winches, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, vertical multitubular donkey boiler, steel shifting boards, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead and all requirements for a first-class cargo steam specially equipped for the Baltic and Home trade. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 20 in., 31½ in. and 53 in. diameter, with a piston stroke of 36 in. and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. Oluf Mersk Moller on behalf of the owner.

BOEROE. Launch, February 27th. Steel screw steamer built for The Netherland Steamship Company, Amsterdam. The vessel will take the highest class in Lloyd's Register, and is of the following deminsions, *viz.* :—Length overall 433 ft. 6 in., breadth 54 ft. 6 in. and depth 36 ft. She is of the awning deck type, having three decks laid. In addition to cellular double bottom and after peak tank for water ballast there is a deep tank or hold compartment fitted abaft the engine room giving a total capacity for water ballast of about 2,200 tons. Electric lighting is fitted in all accommodation and working parts as well as fixed lights in all cargo compartments. The engines are of the triple-expansion type, supplied by The Central Marine Engine Works of the builders, having cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 54 in., and four large steel boilers adapted for 180 lbs. working pressure per square inch, and fitted with Howden's system of forced draught. A special feature of the boiler installation is the "Cmew" type superheater, designed and made by the engine builders with a view of utilizing to the utmost the heat from the gases on their way to the funnel. A special system of "Cmew" auxiliaries, including a winch condenser, evaporator, independent feed pumps combined with a gravitation filter and feed water heater arranged to ultilize the heat from the exhaust steam

will be installed in the engine room. The vessel and machinery have been constructed under the superintendence of Mr. S. G. Visker, assisted by Mr. W. J. Feykes, on behalf of the owners.

BANKA. Trial Trip, February 25th. Steel screw steamer. The trial trip took place on this date, and the performance of the ship and machinery was entirely satisfactory. For Launch, see our February issue.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

MICHAEL. Launch, March 12th. Steel screw steamer constructed for the Booth Steamship Co., Ltd. of Liverpool. The vessel is intended for the Iquitos (Peru) trade, Iquitos being about 2,000 miles from the mouth of the River Amazon. Steamers of the Booth Line on that route, in order to reach their destination, steam through Brazil. The vessel is specially designed therefore for the Atlantic passages and the long voyages up and down the River Amazon. The vessel is of the two-deck type with poop, bridge and forecastle, and is being built for classification at Lloyd's, her principal dimensions being 312 ft. 3 in. by 45 ft. 3 in. by 28 ft. moulded depth, and she will have a deadweight carrying capacity of nearly 4,000 tons on a light draught of water. Sanitary and galley accommodation for steerage passengers is provided in the poop. Water ballast will be carried in cellular double bottom, peaks and deep tank. There will be a very complete installation of electric light and fans and refrigeration and all other latest improvements for a vessel trading under tropical conditions and for the rapid handling of cargo. The propelling machinery will be fitted by the North Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne, and will consist of a set of triple-expansion engines with cylinders 23 in., 38 in. and 63 in. by 42 stroke, with three large single-ended boilers working at 180 lbs. pressure and fitted with Schmidt's superheaters. The construction of the hull is being carried out under the supervision of Mr. G. K. Butler-Stoney and Mr. J. A. Fisher and the machinery and boilers are being built under the superintendence of Mr. William Beckett.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

GRAMPIAN RANGE. Launch, February 26th. Steel screw steamer built to the order of Messrs. Furness, Withy and Co., Ltd., for the Neptune Steam Navigation Co. The dimensions of the vessel are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation Classification, having a single deck of steel with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the storage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting into a tank in the engine room and ten derricks. A powerful quick-warping steam windlass is fitted forward, and combined steam and hand-steering gear on the Wilson & Pirrie principle is fitted in a house aft, with telemotor attachment to the bridge. A large ice house is also fitted for the crew's provisions, etc. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons" standard triple-expansion engines, having cylinders, 25 in., 40 in. and 68 in. by 48 in., with three large boilers working at a pressure of 150 lbs. per square inch. The condenser is of the Contraflo type with temperature regulator and the engine-room auxiliaries include a cascade feed water heater and filter, a Morison evaporator, large ballast donkey and harbour feed pump, etc. The hull and engines have been built under the superintendence of Mr. D. Ross.

Ropner & Sons, Ltd., Stockton-on-Tees.

GREAT CITY. Launch, February 25th. Steel screw steamer of the following dimensions, length 433 ft. 6 in., breadth extreme 56 ft. 9 in., depth moulded 36 ft. 9 in. The vessel is built to the highest class in the British Corporation Registry, having upper and shelter deck, and has been built to the order of Messrs. W. R. Smith & Sons, of Cardiff. A double bottom is provided for water ballast on the cellular principle, and in the fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam steering gear amidships, and powerful and screw gear aft, and is fitted with eleven large steam winches exhausting into a separate winch condenser. A Marconi wireless telegraph installation will be fitted on board the vessel. The vessel is fitted with double derricks to each hatch, and all her appliances for loading and discharging cargoes are very complete. Triple-expansion engines will be supplied by Messrs. Blair & Co., Ltd., Stockton-on-Tees, having cylinders 28 in., 46 in., 75 in. by 48 in. stroke, steam being supplied by three single ended boilers each 16 ft. by 11 ft. 6 in., with a working pressure of 180 lbs. The building of the vessel has been superintended by Captain Compton, the owners' marine superintendent.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

SICILY. Trial Trip, February 16th. On her trials the vessel attained a mean speed of over 12 knots, notwithstanding the heavy weather conditions obtaining at the time. For Launch, see February issue.

Smith's Dock Co., Ltd., Middlesbrough.

ARABIS. Launch, March 17th. Cargo motor vessel built to the order of the Flower Motor Ship Co., Ltd. (Messrs. M. Samuel & Co., managers), the hull being constructed at the Middlesbrough yard of Messrs. Smith's Dock Co., Ltd., and the motors by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at the Neptune Works, has been successfully launched at Middlesbrough. The vessel will carry nearly 6,000 tons deadweight. The pumping arrangements are very complete. She has complete gear for handling cargo, including eight steam winches. Oil fuel is carried in all the double bottom tanks and also in fore and after peaks with special heating and pumping arrangements. The *Arabis* is being built to Lloyd's highest class and will have Suez Canal certificate, and both hull and machinery are being constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. The dimensions are:—Length b.p. 350 ft., breadth moulded 47 ft., depth 27 ft. She will have a mean draught of about 21 ft. 6 ins. and spacious 'tween decks 8 ft. high available for the pilgrim traffic and for military transport. The vessel is fitted with twin-screw Diesel motors of the polar type, working on the two cycle principle with four working cylinders on each motor and developing 1,150 b.h.p., built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., and possessing many special features of detailed improvements in the design. Two ample powered donkey boilers are being fitted for supplying steam for the deck machinery and for the steering gear and electric light, and are being arranged to burn coal and oil fuel and also to work economically at sea by the exhaust gases from the main propelling motors.

SOUTH OF ENGLAND.

Day, Summers & Co., Ltd., Southampton.

TOWY. Launch, February 26th. This is the first of three boats which Messrs. Day, Summers & Co., Ltd., are building for the Royal Mail Steam Packet Co. Immediately after the launch the ship was berthed under the sheers and the engines and boiler lifted on board. It is anticipated that the other two ships will be launched at intervals of a month. These vessels are intended for the inter colonial trade and will be delivered in the West Indies in the course of the summer.

J. I. Thornycroft & Co., Ltd., Southampton.

H.M.S. LANCE. Launch, February 25th. This is the fourth ocean-going torpedo boat destroyer to take the water from this yard within the past seven months. Several of her predecessors launched since July have already been delivered and five destroyer berths are now available for fresh keels. This number will shortly be increased to six on the launch of the *Lookout*, a sister ship. The *Lance* and *Lookout* are vessels of about 270 ft. length and 27 ft. 6 in. beam, and are fitted with Parsons turbines and water-tube boilers burning oil fuel. The hulls, propelling machinery and boilers being built complete in Messrs. Thornycroft's Yard and Works, which are capable of turning out vessels of any description up to 3,500 tons and machinery of the highest

powers. Recent extensions and improvements have greatly increased the building capacity, both as regards hulls and machinery.

Philip & Son, Ltd., Dartmouth.

BAIARA. Launch, March 17th. Twin-screw passenger steamer, building to the order of the Crown Agents for the colonies, designed by and built under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. The vessel is one of the six similar vessels which Messrs. Philip & Son are building for passenger ferry service in British Guiana, the principal dimensions being :—Length b.p. 100 ft., beam moulded 23 ft., depth moulded 9 ft. The hull of the vessel is sub-divided by four steel watertight bulkheads, the compartments consisting of fore and aft-peak tanks, fore and main holds, and engine and boiler space. The whole of the accommodation for passengers, officers and crew is arranged above the main deck. Accommodation for first-class day passengers is provided on a roomy upper deck, where a dining saloon is arranged with bar and pantry adjoining, special provision having been made for thorough ventilation. The captain's room is built at the fore end of the upper deck immediately abaft the steering position, and a small house, which is to serve both as purser's room and post office is built near the aft end of the upper deck adjoining the saloon deck house. A permanent wood awning is provided over full length and width of upper deck, and a teak deckhouse is arranged on the aft part of main deck, embodying engineer's day cabin, lamp room and galley. The crew are berthed forward in comfortable quarters in the topgallant forecastle. A steel mast is fitted forward for carrying a derrick to work the fore cargo hold. A steam winch is also fitted for quick handling of cargo and baggage. A large space is specially provided on the fore part of main deck for the carriage of motor cars, wagons and cattle, especially large doors being provided in the bulwarks for easy embarking and disembarking. The aft part of main deck is specially arranged with seating accommodation for third-class passengers. Two sets of compound surface-condensing engines are arranged in a roomy engine-room amidships, being supplied with steam at 140 lbs. pressure by a large single-ended horizontal return tube marine type boiler. Especially large independent air and circulating pumps are provided, also independent feed and general service donkey pumps. Steam windlass is fitted on topgallant forecastle; steam-steering gear is also to be fitted and the vessel is to be lighted throughout by electricity.

NORTH-WEST OF ENGLAND.

Cammell, Laird & Co., Ltd., Birkenhead.

KARMALA. Launch, March 14th. This steamer is the third of four vessels ordered from Messrs. Cammell, Laird and Co., Ltd., Birkenhead, by the P. & O. Steamship Company, and she is 480 ft. long and of about 9,000 tons gross. She has a deadweight capacity of over 10,000 tons and engines of about 7,000 i.h.p. Accommodation is provided for about 150 first class passengers, and special provision has been made for ventilation in hot climates. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Enamels have been applied throughout the bunkers, tank, double bottom, etc., and their Patent "Bitumastic" Covering to the tank tops.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

ENGLISH ROSE. Launch, February 28th. Steel screw drifter, principal dimensions, 115 ft. by 21 ft. 6 in. by 12 ft. moulded. The vessel has been built to the order of Mr. R. Sutton, of Great Yarmouth, and will be fitted with engines by Messrs. Elliott & Garrood, Ltd., Beeeles.

PRINCE PALATINE. Launch, February 28th. Steel screw trawler, principal dimensions, 123 ft. 4 in. by 22 ft. 6 in. by 13 ft. moulded. The vessel has been built to the order of Messrs. The Cargill Steam Trawler Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

BARLE. Launch, March 14th. Steel screw trawler, principal dimensions, 135 ft. b.p. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. G. W. & H. B. Jeffs, Steam Trawler Owners, Grimsby, and is to be fitted with powerful triple-expansion engines by Messrs. Amos and Smith, Ltd., of Hull.

SCOTCH.

Ailsa Shipbuilding Co., Ayr.

MAPLE. Launch. Steamer built to the order of the Laird Line, Glasgow, for their passenger and cargo service between Glasgow and Londonderry. The dimensions of the vessel are :—Length b.p., 260 ft. ; breadth, 36 ft. ; depth, 16½ ft. to main deck. She has been built to Lloyd's 100 A1 class, and to the Board of Trade requirements for the carriage of passengers and cattle, and in accordance with the Board of Agriculture and Irish Privy Council's rules and requirements for the carriage of live stock. The vessel has poop, bridge and forecastle decks, and between bridge and the forecastle an island deck. Above the bridge deck there is a promenade deck, under which accommodation has been provided for 112 first-class passengers. On the bridge deck at the forward end there is a well-appointed dining-room, with pantry accommodation, and aft a first-class smoking-room. The poop is set apart for steerage passengers.

Barclay, Curle & Co., Ltd., Whiteinch.

BARPETA. Launch. Steel screw steamer, the sixth of her class built for the British India Steam Navigation Company, Limited. The vessel is constructed to the highest class of Lloyd's Registry, and is of the following dimensions :—Length 340 ft., breadth 46 ft., and depth 25 ft., with a gross tonnage of 3,300, and a deadweight capacity of about 4,400 tons. The outfit of winches and other deck machinery is unusually complete. The vessel has electric lighting and steam heating throughout, and will have an installation of wireless telegraphy. The machinery, which is being constructed by Messrs. Barclay, Curle & Company, Limited, consists of one set of triple-expansion engines, taking steam from four boilers of sufficient power to ensure a sea speed of 12 knots.

MASHOBRA. Trial Trip. Successful speed trials have just been completed of the *T.S.S. Mashobra*, built for The British India Steam Navigation Company. The vessel attained a speed of 14 knots on trial. For Launch, see February issue.

Wm. Chalmers & Co., Rutherglen.

INNISVERA. Launch, March 2nd. Motor Coaster built for the Coasting Motor Shipping Company, Glasgow. The vessel is 120 ft. in length over all, 21 ft. 6 in. in breadth, and 9 ft. 1 in. in depth, and she will carry 400 tons on a draught of 10 ft. The cubic capacity for cargo is 14,500 ft. There is one specially large hatch, measuring 46 ft. by 14 ft. 6 in., intended for loading boilers and other large consignments. The navigating bridge is on a raised quarterdeck aft. The propelling machinery consists of internal-combustion engines of 220 b.h.p., supplied by Messrs. William Beardmore & Co. Dalmuir, and having four cylinders each 4 in. in diameter and with a stroke of 14½ in. The engines are direct reversible, on air supplied by an auxiliary motor. The vessel is fitted with two motor winches, one of 2 tons and one of 1 ton. These, working on double gears, have lifts of 4 tons and 2 tons respectively.

Dunlop, Bremner & Co., Port Glasgow.

CHONGTU. Launch, March 1st. Single-screw steamer of 2,300 tons gross, built for the China Navigation Company, Ltd., London. She is 285 ft. in length, 45 ft. in breadth, and 20 ft. in depth. Scotts' Shipbuilding and Engineering Company, Greenock, will supply the triple-expansion engines.

Wm. Hamilton & Co., Ltd., Port Glasgow.

FLOATING DOCK. Launch, February 26th. This is a type of vessel which, as far as the Clyde is concerned, is peculiar to this firm. The vessel in question is a steel double walled floating dock of the box type, built to the order of the British Admiralty. The dock is a self-contained unit, the necessary pumping machinery being situated in one of the sidewalls, and is provided with two rows of keel blocks, one on each side, but arrangements are made so that when desired to dock one vessel only, one complete set can be placed at the centre. The Dock is also provided with a large number of shifting bilge blocks with sliding pad pieces on top. These

pad pieces can be brought into position whenever the vessel takes the keel blocks by means of chains and blocks operated from top or sidewall. Mechanical shores, operated from sidewall deck, are provided for centring the vessel being docked and for holding the vessel in position until the ordinary shores are got into position. A large all-round crane is fitted to each sidewall, capable of traversing the whole length of sidewall and dealing with heavy weights. A complete electric installation has been fitted to thoroughly light up the dock for general purposes, to provide light for carrying on repairs at night, and to furnish current for vessels using the dock. To provide against fire, either in the dock or in the vessel using the dock, a complete fire service has been installed. This service can be used for washing down vessels in dock prior to painting. The valves regulating the docking are all controlled by means of levers placed in a deckhouse at one end of sidewall. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Enamels have been applied to the entire outside surfaces of the dock.

Harland & Wolff, Ltd., Glasgow.

MISSOURI. Trial Trip, February 28th. After satisfactory trials this vessel left Belfast and proceeded to London. For Launch, see January issue.

FALSTRIA. Launch, March 12th. Twin screw motor vessel, the first of two sister vessels under construction by the same builders for the East Asiatic Co., Ltd., of Copenhagen. The length over all is 381 ft., breadth moulded 50 ft., and gross tonnage about 4,500. The new vessel is built on the latest principle, with double bottom and watertight bulkhead sub-division. The main and upper decks, also poop, bridge and forecastle decks are of steel. The vessel is built to the highest class of Lloyd's Register. The *Falstria* will have excellent accommodation for a number of first-class passengers, and all the arrangements for working ship and cargo have been carefully devised with a view to the utmost efficiency, the winches and windlass being electrically operated, and the steering gear arranged on the electric hydraulic principle. She is rigged as a three-masted schooner, with 14 derricks arranged to lift from 3 up to 10 tons, and, in addition, a heavy one to lift 25 tons. The vessel is fitted throughout with electric light, and has also wireless telegraphy apparatus. A donkey boiler is provided to supply steam heating in all living rooms in the ship, including saloon, smokeroom, messroom, wireless room and chart room, also for the supply to the fresh-water condenser. As already indicated, the *Falstria* is a twin screw motor vessel, and will be fitted with two four-stroke cycle single-acting Diesel motors, each coupled direct to its line of shafting, also two four-stroke cycle single-acting auxiliary Diesel motors, each coupled direct to a dynamo and an air compressor. Each of the main motors has six cylinders. As is well-known, the East Asiatic Co., Ltd., have taken a leading place in the development of motor shipping, and the success of their vessels has demonstrated the advantages of internal combustion engines for marine purposes on the Diesel system, questions of economy, reduction in weight of fuel, increased earning capacity the absence of boilers and the greater facility of fuel supply and handling tell very greatly in favour of the motor ship; and as regards the motor itself, it is a great advantage that one or more of the cylinders, all of which work independently of each other, can in case of need be instantaneously disconnected without the stoppage of the engines for that purpose. During construction the vessel has been under the supervision of Captain Berentzen.

Hawthorns & Co., Leith.

IFE. Launch. Twin-screw motor coasting vessel for Messrs. Elder, Dempster & Co., Liverpool. This vessel is to be used for coasting purposes on the West Coast of Africa. Her dimensions are:—Length over all, 140 ft. 6 in.; breadth, moulded, 25 ft.; depth moulded, 10 ft. She will be fitted with two sets of Bolinder reversible crude oil motors of 120 b.h.p. per set and with all the latest improvements for the quick discharging of cargo. She is the second of two duplicate boats which Messrs. Hawthorns are building for the same owners.

Napier & Miller, Ltd., Old Kilpatrick.

ORANIAN. Launch, March 11th. Steel screw steamer to the order of Messrs. F. Leyland & Co., Ltd., Liverpool. The vessel has been built to the highest class in Lloyds (special survey). The principal dimensions are: Length b.p. 365 ft., breadth moulded 47 ft. 6 in., depth 29 ft. 6 in., with a gross tonnage of about 3,900 tons and carrying capacity of 6,300 tons. She has complete upper and main decks, with poop, long bridge and top-gallant forecastle water ballast in cellular double bottom and fore and aft peaks. The vessel has a most complete and convenient arrangement of hatches, derricks (including one for 30 tons and one for 15 tons lifts) and seven steam winches for the rapid handling of cargo; electric light, steam-steering gear, steam heating and refrigerating machinery. The machinery, which is being supplied by Messrs. Dunsmuir & Jackson, Ltd., Govan, consists of triple-expansion engines with cylinders 25½ in., 42½ in., 72 in. by 48 in. stroke; there are three-single ended boilers of large size. The hull and machinery have been constructed under the direction of Mr. Scott and Captain Fry, Superintendents for Messrs. F. Leyland & Co. Messrs. Matthew Keenan & Co., Ltd., have the contract for the boiler and pipe coverings on this vessel.

Russell & Co., Port Glasgow.

ADELINA. Launch. Steamer built to the order of the Serra Line, Ltd., Liverpool. The vessel is built to the highest class at Lloyd's, and is of about 4,000 tons gross register. Machinery will be supplied by Messrs. Rankin & Blackmore, Greenock.

Wm. Simons & Co., Ltd., Renfrew.

DREDGER "No. 4." Launch, February 25th. Twin-screw "Simons" cutter suction reclamation dredger, constructed to the order of the Russian Government. The vessel, which was launched complete and ready for work, has been built under the survey of Bureau Veritas for classification in their register, and under the inspection of Captain M. A. Schmidt, I.R.N. The dredger is fitted with two sets of compound surface-condensing engines, each driving its own propeller. Steam is supplied by two steel multitubular boilers constructed to Bureau Veritas requirements for 160 lbs. working pressure. The dredging pump is driven by an independent set of triple-expansion surface-condensing engines. The cutter is driven from a set of vertical compound engines through cast steel gearing of very massive construction. The suction frame is designed for dredging the vessel's own flotation and to a depth of 40 feet below water level. The dredging and discharging capacity is 1,000 tons per hour. A complete electric light installation is provided throughout the vessel, and all cabins are heated by steam

DREDGER "NO. 5." Launch, March 16th. For the same Government, is designed for dredging to a depth of 65 feet below water level.

Mackay Bros., Alloa.

STEAMER. Launch, March 17th. Dimensions:—286 ft. in length, 42 ft. 6 in. in breadth and 22 ft. 6 in. in depth moulded. The engines will be supplied by Earle's Shipbuilding & Engineering Co., Hull, and the vessel is reported to be for American owners.

IRISH.

Workman, Clark & Co., Ltd., Belfast.

CARNARVONSHIRE. Trial Trip, March 7th. This new twin-screw steamer left Belfast Harbour on the above date and proceeded to Carrick Roads for machinery tests and speed trials, which were most satisfactory. The vessel afterwards left for Antwerp to take in cargo for her first voyage. For Launch, see January number.

FOREIGN.

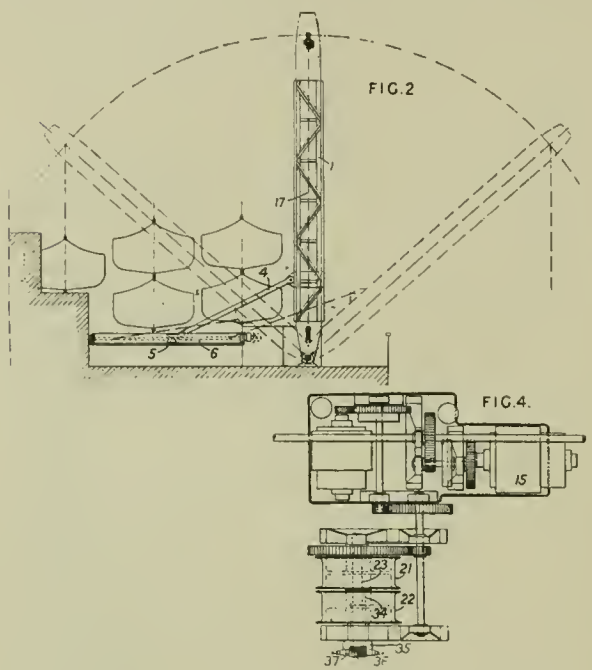
Antwerp Engineering Co., Hoboken, Belgium.

LOWTHER CASTLE. Launch. The *Lowther Castle*, which is the largest steamer yet built in Belgium, is to the order of The Lancashire Shipping Co. of Liverpool. She is a vessel of 400 ft. in length, 52 ft. in beam, with a tonnage of 7,620, and a draught of 24 ft. The triple-expansion engines develop 3,000 horse power, with an average speed of 11½ knots. The ship has four holds, two masts, eleven cargo chambers, five companion ways, ten steam winches and a steam-steering gear. There is a double bottom, and the after end is arranged to receive water ballast. The Antwerp Engineering Co. have another English steamer of 2,700 tons on hand.

Abridgments of New Patents.

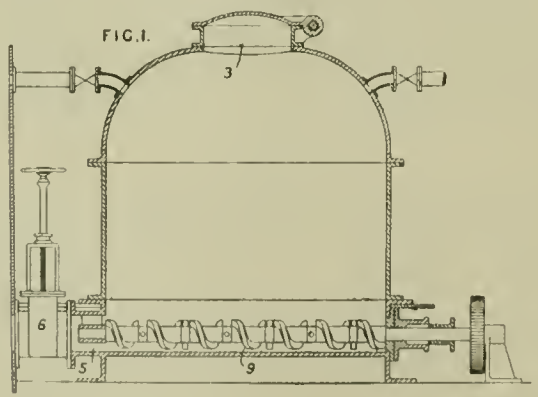
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

Davits; Boat-lowering Gear. No. 26,924.—Davits, turning about a horizontal axis, and having overhanging tips from which the boat is suspended, are capable of turning through a considerable angle on either side of the vertical plane through the axis, so that inboard boats can be handled. The lattice-work davits 1 are operated by a link 4 attached to a slide 5 which works on a screw operated through suitable



gear from a motor 15, Fig. 4. The falls 17 are wound round drums 21, 22, fast and loose respectively, on the shaft 23. The drum 22 is fixed to a sleeve 34 formed with an end-bracket 35 carrying a worm 36 gearing with a worm-wheel 37 on the shaft 23. This construction permits the trim of the boat to be adjusted in the event of the ship being down by the head or stern.

Discharging Ashes from Ships. No. 27,295.—One or more collectors for ashes, etc., are situated below the water-line and are each connected to the sea by two openings at different levels. Each opening is fitted with a valve. The ashes, etc.,



are fed through the opening 3 and fall to the bottom, whence they are discharged by a helical conveyor 9, which forces the ashes, etc., through the pipe 5, past the valve 6, to the sea.

REVIEWS.

The Engineers' Year Book for 1914. Compiled and edited by H. R. Kempe, M.I.C.E., etc. London: Crosby Lockwood & Son; price 15/-.

This really useful year book of formulæ, rules, tables, data and memoranda for engineers has now reached its majority, 1914 being the 21st year of publication, and fittingly the present edition is the largest and best yet issued. There is a total of 1,800 pages and the growth of the publication may be gauged from the fact that it has grown to this number from the original issue, which numbered 586 pages. To celebrate its majority, the revision and extension of the work has been carried out most exhaustively and in a manner unequalled in any previous edition. The value of the publication as an authoritative reference book does not need our testimony. It is known to all engineers and must prove invaluable to them, for the data they require to refer to, in the daily work of their calling, and to which they have such easy reference by possessing the year book. Many eminent specialists have collaborated in the production of the work, *i.e.*, Mr. Percy A. Hillhouse (naval architecture and marine engineering), Mr. Brysson Cunningham (harbour and dock engineering), Mr. A. P. Chalkley (marine Diesel engines), and others. Mr. Valentine Ball is responsible for the section on legal notes for engineers. This standard reference book contains nearly 1,500 illustrations, has a good index and, bound in limp leather, gilt, is a most creditable production to all concerned.

Directory of Telegraphic Addresses. London: Henry Sell. Price 25/-.

This work, which might have for its sub-title "Everything about Telegrams," is published annually, and the edition for 1914 is just out. The Inland abbreviated adddresses are compiled as usual from official lists supplied by the authority of the Postmaster-General. It was founded by Mr. Sell twenty-nine years ago, and has gradually increased in size and usefulness from the first year of issue till now it contains 2,500 pages of names, postal addresses, telegraphic addresses, trades and telephone numbers of manufacturers, merchants, and traders throughout the United Kingdom. An alphabetical index of the registered telegraphic addresses in use throughout the United Kingdom forms Section II. of the volume, and each address bears a reference to Section I., where the name, telephone number, postal address and full business particulars of each firm will be found. In addition under some 3,000 separate trade headings, about 100,000 British firms are arranged according to their respective trades or professions—an indispensable list to commercial men to whom an authentic list of the important firms of this this country is of great value. The publisher has also added a representative list of firms in the British Empire Overseas and foreign countries arranged in countries and towns.

Germanischer Lloyd Register, 1914. Marks 40.

The international register of all vessels classed by this society has now been issued. The register is arranged in very convenient form for ready reference and is mostly printed in German, French and English. In addition to the tabular matter setting out the particulars of the vessels classed, the names and addresses of the Society's agents and surveyors throughout the world and the rules for classification are given. The volume is handsomely bound.

Pearson's Nautical Almanack, 1914. London: Imray, Laurie, Norie & Wilson, Ltd.

The 55th annual edition of this publication has now come to hand and is full of all the necessary information required by the navigators of steamships and sailing vessels. The tide tables give the daily times and height of high water at numerous ports in the United Kingdom, and at a selection of foreign ports. Port charges, exhaustive lists of lights and fog signals, buoys, beacons, sailing directions, official rules for avoiding collisions, particulars of Lloyd's signal stations, etc., etc., give an idea of the comprehensive nature of the publication, which is published at 1/-.

Ice and Cold Storage Trades Directory. London: Iliffe and Sons, Ltd. Price 5/-.

The 14th edition has been carefully revised and brought up to date. This publication is a most useful one for all wh[o]

are connected with the refrigerating industry and allied trades in the United Kingdom. In one section of the book is included an exhaustive list of all vessels fitted with refrigerating machinery, which must be of considerable service for reference purposes. The book is a very complete guide to all that is done in the world of refrigeration, and its sections are conveniently arranged so that information may be readily found.

Royal Navy List. London: Witherby & Co. Price 10/-.
This quarterly is an excellent guide to the personnel of the Navy, both active and retired, and to the ships of the fleet. It was founded in 1878 by the late Lieut-Col. Francis Lean, R.M.L.I. No. 145 dated January, 1914, will be the last quarterly issue, as it is intended to publish the list annually in future, and the first publication of the new issue will be early in July. The annual publication will be developed more upon the lines of a naval Who's Who, the present section dealing with the services, honours and special qualifications of naval men being specially dealt with and developed to include the main particulars and careers of executive commissioned officers and of the principal civil officers as well. The price of the annual issue, cloth-bound, will be 7/6.

The Stoker's Guide to Promotion. London: The Fleet, Ltd. Price 3/6.
This book has been written to deal exclusively with the various examinations the naval stoker has to pass for a higher rating. Only the necessary subjects are dealt with, and that in the clearest and most concise manner possible. All those who read the contents of the book carefully will possess the knowledge to pass their examinations. Questions for Yeomen of Stores and Engineer's Writer are included, and should prove of use to those connected with the engine-room department. The first part of the book is devoted to explaining in as simple a manner as possible, arithmetic, then follow three sections on boiler questions, engine questions and workshop appliances and practice. In each section the question is first put and followed by the answer, which, if necessary, is illustrated to give a better understanding to the reader.

Shipmasters' Handbook to the Merchant Shipping Acts. By Sanford D. Cole. Glasgow: James Brown & Son. Price 5/- nett.
Mr. Sanford Cole has prepared a much enlarged and revised edition of his well-known handbook to the Merchant Shipping Acts, which has been issued at five shillings net by Messrs. James Brown & Son, of Glasgow. The handbook now deals with the whole series of Merchant Shipping Acts and Regulations from 1894 to date. It is written primarily for shipmasters and others not conversant with legal matters, but probably the new edition, like those preceding it, may be found useful by solicitors as well as by nautical men. The full text of the Acts and Regulations is given, with explanatory notes in relation to all the more important matters, and where this is not done the legal provisions are dealt with by condensed explanatory statements. In its enlarged form the book will be more completely and permanently useful. There is a very useful index, which is arranged in sections and affords quick reference to any part of the publication.

Travelling Palaces. By R. A. Fletcher. London: Sir Isaac Pitman & Sons, Ltd. Price 10/6 nett.
In this interesting volume Mr. Fletcher, a well-known writer on shipping subjects, deals with the great liners of to-day from the point of view of the passenger. The author describes the development of the modern passenger steamship, showing how one improvement and attraction after another has been added, and how the craze for size, speed and luxury has been responded to by shipowners. He deals at some length with the special features introduced to meet the requirements of the different trades. The construction of the various classes of ships is explained, together with the means taken to assure, as far as possible, the safety of the travelling public; and attention is also given to the details of the engine-room equipment, the stores and provisions carried, with the culinary, sanitary and lighting arrangements, the crews, and the staffs of cooks and stewards. Mr. Fletcher has travelled extensively, and the practical experience thus gained of conditions afloat has enabled him to write with first-hand knowledge. Contrasts are drawn between past and present liners, and there are also references to the excellent coastal services of the British Islands, the railway companies' steamers and the magnificent steamers of the American rivers. The book contains over fifty illustrations.

All About Engineering. By Gordon D. Knox. London: Cassell & Co., Ltd. Price 6/-.
"All about Engineering" is one of a series of four books by the same author, dealing separately with "Airships," "Ships" and "Railways." It has been written for boys, as the author believes that there are few boys throughout the British Empire who are not, more or less, keenly interested in engineering. The volume takes the form of a popular history of the great civil and mechanical engineering wonders of the world, and the author has achieved his purpose with excellent results, describing in clear and simple language all that pertains to the subject and producing a book which holds the interest of the reader to the end. Among the engineering feats described we find "The Panama Canal," "Harnessing the Nile," which deals with the great dams at Assouan and elsewhere. "The control of Niagara." Other chapters deal with bridge building, marine salvage, lighthouses, docks, harbours, breakwaters, etc., and another chapter is devoted to the evolution of the steamship from 1833 to the White Star liner *Britannic*, recently launched. A considerable number of illustrations are included, which add to the interest of the book.

Reed's Tables of Distances Sunderland: Thomas Reed and Co., Ltd. Price 1/6; roan, 2/6.
This is the tenth edition of a convenient little book of distance tables, compiled by Messrs. H. Whittingham and C. T. King. The fact that the publication is in its 10th edition, which has been carefully revised and enlarged, speaks well for the reception the book receives. The tables give the distances between ports and places in all parts of the world, and comprises over 31,000 distances. Several new tables have been added in view of the opening of the Panama Canal, and a large number of distances *via* the Canal have been added. The whole work is so arranged as to ensure easy and rapid reference.

Engineering and Metallurgical Books. A Bibliography. By R. A. Peddie. London: Grafton & Co. Price 7/6.
The works comprised in this bibliography are those published during the years 1907-1911. The author has brought together all discoverable titles of publications, comprised in engineering and metallurgy, issued in the English language in the years stated. An index showing the authors' names and a table of subject headings in classified order are also given. Much credit is due to the compiler of this bibliography, which without doubt must be of great service to all those interested.

Electrical Installation Manuals.
Three new books have been recently added to this series and published by Messrs. Constable & Co., London, *viz.*, Switch gear and the control of electric light and power circuits, by A. G. Collis, 1/- nett. Testing, fault localization and general hints for wiremen by J. Wright, 1/- nett. Bells, Indicators, Telephones, fire and burglar alarms, etc., by J. B. Redfern and J. Savin, 1/6 nett. The books are of pocket size, well illustrated and clearly and concisely written by the respective authors.

The Dynamo.
How to manage the dynamo is a little handbook written by Mr. A. E. R. Bottone, for engineers, electricians and electro-platers. No attempt is made at explaining the theoretical or constructional details, the book being solely written for those engineers who may be suddenly called upon to undertake the management of the dynamo of an electric light or electro-plating installation. The cost of the book is 9d., and the present edition is the fifth. The publishers are Whittaker & Co.

London Shipping, Glasgow Shipping and Liverpool Shipping.
The 1914 editions of these publications issued by Messrs. Charles Birchall & Co., Ltd., are sold at 1/- each. A large amount of information is contained in the guides relating to the port with which each volume deals. They are nicely printed and each volume is supplied with a map or maps. The books will be found useful by those engaged in the shipping world.

The Fleet Annual. Price 1/-, The Fleet, Ltd., London.

The Fleet Annual, compiled by Lionel Yexley, has just been issued. The larger portion of the book is taken up by "The Navies of the World," which sets out lists of the war vessels belonging to Great Britain, Germany, France, U.S.A., Japan, Italy, Austria, Russia, Chili, Argentine and Brazil. Other lists show the full pay of officers and men in the Navy and Marines. Preceding these lists are some interesting chapters on developments in naval guns, the Curtis mixed pressure and reducing turbines and oil fuel.

Laying-off, or the Geometry of Shipbuilding. By Edward L. Attwood, M.Inst.N.A., R.C.N.C., and I. C. G. Cooper. London: Longmans, Green & Co. Price 6/- net.

This is a much-needed book, one of whose authors—Mr. E. L. Attwood—needs no introduction to the specialized, or indeed to the general reader. The only modern book known to us on this subject costs fifteen shillings, and as this is a prohibitive price to the young workman, we welcome a thoroughly good, popular-priced book on the subject. The opening chapter on descriptive geometry is an excellent introduction to the work of the mould-loft floor, and saves breaking off in the middle of a description of some method in order to explain the principle on which it is based. A strong point of the book is the way in which the authors insist on the practical requirements of the workman being kept in view by the loftsman throughout his work. Checking of accuracy in every conceivable way is also insisted on; this speaks for the thoroughness with which the authors have performed their task. Though the book deals mostly with warship work, the problems are such as to cover all the requirements of merchant practice, to which the transition is easily made. The only exception that can be taken to this excellent work is that in one case at least—that of the getting of the outside bossing in way of a twin-screw shaft—a more detailed explanation of the various steps would have been useful, and the complicated case of shafts inclined in two directions might have been introduced by the simpler case of parallel shafts. The book is well indexed and has an appendix of thirty-nine questions culled from various sources, besides examples which are dispersed throughout the text. The illustrations, of which there are 121, are carefully and well drawn.

The Diesel or Slow-Combustion Oil Engine. By G. James Wells, Whitworth Scholar, and A. J. Wallis-Taylor, C.E. London: Crosby Lockwood & Son. Price 7/6 net.

The object of the authors has been the treatment of the subject of the combustion engine from a somewhat different point of view from that taken by many of the authors of papers read before the various scientific institutions and societies. Their aim has been to treat more specifically and more fully the design and construction of engines working on the slow-combustion system, so that draughtsmen, students and other interested persons can have the information in a compact volume.

The book is divided into ten chapters, the first being an introductory one, giving a short historical account of the origin and development of the Diesel or slow-combustion type of engine. Chapter II. deals with the subject of heat, thermometry and measurement of heat. Chapter III. treats of expansion, the "peevee" diagram of work, the measurement of work done during expansion. Chapter IV. deals with heat diagrams; heat chart, and its use in solving problems graphically; the significance of the movement of the "state" point; examples of heat cycles and the "Diesel" cycle. Chapter V. deals with oil fuels, their nature, composition and caloric values; methods of utilization of fuels, fuels suitable for use in Diesel engines; cost of fuels suitable for use in the Diesel engines; commercial value of liquid fuels, and method of transport and storage of liquid fuels. In Chapter VI. a brief account of the balancing problem has been given, based upon the desirable method developed by Professor Dalby, and it is hoped that this necessarily condensed account will be found a useful introduction to the subject. Chapter VII. gives some test results, and some hints on the matter of testing a Diesel engine. Some notes upon the attention required when running are added. Air compressors are dealt with in Chapter VIII., starting with the ideal diagram, then noting the effects due to clearance, volumetric efficiency, best ratio of diameters for stage compression, work done in compression, gains due to stage compression, heat generated, temperatures, example with the results tabulated for ready comparison, concluding with an account of some tests. Chapter IX. gives a general idea of the turning effort on the crank, based upon the indicator cards, with hints how they may be easily combined according to number of cylinders and position of cranks. Cylinders are discussed for strength, ratio of stroke to diameter, piston speeds, size for a given output. Loads on piston-pins, crank pins, formulæ for crankshafts. Inertia effects of valve gearing, how to estimate the forces necessary to ensure proper working of valves. Injection valves, importance of proper setting. Action of pulverizer, etc. This chapter was intended to have given the details and proportions of the parts more fully, but there is considerable difficulty at the present moment in obtaining the requisite data, and the authors hope to enlarge this section very materially in future editions. Finally, Chapter X. contains descriptions of some leading designs of Diesel engines now built for use on land and for marine service, and remarks on the possibilities of use of Diesel engines on railways and tramways. The authors are to be congratulated on the excellent book they have written on the subject.

Marine Boiler Management and Construction. By C. E. Stromeyer. London: Longmans, Green & Co. Price 12/6 nett.

This is the fourth edition of this work, and as has been intimated in dealing with the previous editions, the information comprised in the work has been collected for the use of those interested in the manufacture and management of marine boilers and has therefore the purpose of educating two classes of individuals, namely, the manufacturer and the user, after the boiler has left the manufacturer's hands. The new edition deals with the results of experimental researches into a variety of subjects, the accumulation of which affect either directly or indirectly the management or construction of boilers. For example, the explanation why high temperature flames associated with perfect combustion lead to furnace troubles, the influence of the speed of a gas on its heat transmission, the optical measurement of strains, and the author's experiments on the fatigue of metals, particularly as to brittleness caused by the presence of nitrogen in steel and on water hammers in steam pipes. The results of a large number of experiments with flat plates made by the Board of Trade, the German Admiralty and others have been carefully summarized, with the result that greater harmony appears to exist than might have been expected. The increasing use of high speed tool steel and of electric and oxy-acetylene welding are also dealt with in the present edition.

The rearrangement of the Board of Trade Rules in the early part of 1913 has necessitated the modification of the last chapter in the present edition. However, the leading chapters on construction and management are substantially the same as before as comparatively few additions or alterations have been made.

Handbook on the Steam Engine. By Herman Haeder. Translated by H. H. P. Powles. London: Crosby Lockwood & Son. Price 7/6 nett.

This edition is the fourth published in English and is substantially the same as the last edition, a special feature being an appendix of about sixty pages on the subject of steam turbines, comprising formulæ and diagrams dealing with the typical makes of steam turbines. The present edition has been divided into fourteen sections with the appendix already referred to, and the letterpress of over 500 pages is illustrated by nearly 1,100 illustrations and diagrams. It is a compilation of data enabling results of Continental practice to be compared with those of English practice, and it will be recognised that the work is a valuable one, as the material contained in the very extensive tables must be of material assistance to the designers of steam machinery.

Mr. Cumberland Lowndes, who has been appointed manager of the Port of London Authority, is forty-five years of age. He has been connected with the London and North-Western Railway for the past thirty years, and leaves the position of chief outdoor goods manager for his new post.

The Marine Engineer

And Naval Architect.

LONDON, MAY, 1914.

NAVAL DISCIPLINE.

THE Admiralty have decided after experiment to vary the arrangements as to police duty on naval vessels, not from the point of view of abolishing police work in any way, but by transferring the disciplinary duties previously performed by the naval police to specially selected petty officers. After careful consideration it was decided before making any new arrangements as to routine in Home Fleets, to carry out a preliminary experiment on board the *Queen Mary*, commanded by Captain W. R. Hall, and as such experiment has proved satisfactory, the new system is to be extended to other vessels as they go into commission. The pith of the system is that a chief petty officer, known as a master seaman, assisted by other petty officers, is responsible for the disciplinary duties connected with the seaman branch, while a master stoker, with petty officers under him is responsible for similar duties connected with the stoker branch. It must be understood that these petty officers continue to perform the ordinary functions of their ratings. An example may be given such as that in the case of the *Queen Mary*; thus the two watches, starboard and port, into which the ship's company was formerly divided is substituted by three watches, respectively, red, white and blue, whereby more flexibility and greater adaptability to war routine are given to the complement of the vessel. On Sunday the liberty men, instead of having to fall in for inspection, are practically allowed to suit their own convenience; boards are hung up, one for each watch, and when a man leaves he puts a peg in the hole which bears his number, and on his return he takes the peg out, so that it is known from an inspection of the board what men are out of the ship and what men are in. The arrangement of the watches is such that, after the breakfast hour, which by the way is longer than usual, *viz.*, fifty-five minutes, the men have practically the rest of the day to themselves. On the *Queen Mary* and other vessels of that size, it is possible to set apart a compartment for use as a church or lecture rooms, or for cinematographic or other purposes of entertainment. Church attendance is optional, but practically all the men attend under the new conditions. It will be interesting to watch the general working of the scheme, which has already been applied to the *Vanguard* of the First Battle Squadron and the *Africa* of the Third Battle Squadron, and to two other ships as the result of the appointment and report of various committees of investigation of the procedure in the different vessels. It will be recognised that in view of the fact that as practically everything depends on the men, and the scheme apparently is working well, the extension of the system will take place, but no doubt the progress of the system will be gradual and consistent with experience from time to time. The men will appreciate the advantages of the new conditions, and we feel sure will recognise the necessity of acting so as to maintain this continuance in its fullest sense.

THAMES ENGINEERING.

IF rumour is correct, those who are able to look back on the times of activity in the engineering works on the banks of the Thames, since which most of the firms who dealt particularly with the marine branch of the subject have disappeared, must feel some satisfaction that one large works of world-wide fame which has been closed for some time is about to be re-opened. The shipbuilding branch of the Thames Iron Works, which is now finally closed, passes to one of the things of the past among many other similar undertakings carried on under names round which much of the engineering history of the nineteenth century has been written. Although one branch is dead, the other branch of the same concern, *viz:* the engineering branch appears from all accounts likely to have fresh life instilled into it. The engine works at Greenwich, built and equipped by John Penn, are to be re-opened at an early date and it is anticipated will afford work for some 1,500 to 2,000 workpeople. We understand that these works fully equipped have been purchased by Mr. Wolf Defries, abundant working capital has been provided and immediate orders sufficient to keep the works busy for twelve months at least are in hand. It is interesting to note that the policy to be adopted is a reversion to that upon which John Penn founded and built up such a large and world-known business. It will be remembered that the original John Penn was a mill-wright by trade and in those days this included general engineering. Being a man of high intellectual power and keen imagination he brought into material being many ingenious and useful devices and attracted similar ideas from other people of the same calibre. A history of the business shows that included in its manufactured products were water-wheels, wind-mills, a steam gun and the first tread-mill ever built. John Penn's son was a man of equally remarkable characteristics and it was in his time that the firm assumed its well-known title of John Penn & Sons. It was not till twenty-five years after the business was founded that the first marine engine was built, but so high was the standard of work which the firm built up and maintained, particularly in the manufacture of marine engines, that orders came in so fast and business grew to such vast proportions as to oust the other branches of work in the factory. One knows quite well that these works were kept going for many years on British and Foreign naval orders and such would have no doubt continued if the relations of the firm with the Admiralty had not assumed a somewhat strained character. It is quite clear, however, that the result of specializing in one particular direction and quarrelling with one's best customer brought about a state of things which could not have occurred if the commercial interests of the firm had been on a wider basis. For the future the business is we understand to revert to its more general character and we trust that the new start will not only benefit the Thames to a certain extent, but will be of great service to Greenwich, which must necessarily have felt the loss in having a large works in its area shut down for so long.

SUPERHEATERS IN THE MERCANTILE MARINE.

ALTHOUGH superheaters were introduced into marine boilers some seventy years ago, their use was discontinued until recent years, owing to rapid deterioration, heavy repair bills, costly renewal and considerable risk of danger in use under such conditions as then obtained. An interesting paper on the subject was read by Mr. Harry Gray at the spring meetings of the Institution of Naval Architects last month. The author points out that the re-introduction of superheaters in boilers and the use of superheated steam in engines of the mercantile marine has been brought about by continuous research, together with costly experiments, by the greater knowledge obtained in the process of making and amalgamating metals, by the improvement in the manufacture of such metals into tubes and other suitable forms, by the introduction of oxy-acetylene and electric welding, by the preparation of lubricating oils for use under high temperatures, together with a mass of data, the result of years of experimenting and investigation, and which has now been put to the crucial test of practical working. The author deals with these various subjects in detail, giving the results of actual performances. The data put forward deals with the use of superheated steam during the last three years, and has been collected by the author from steamers under the control of his firm as consulting engineers. Some extremely interesting results are clearly shown. In the first place, the economy of coal claimed is maintained; the economy with triple-expansion engines of 2,000 i.h.p. after being altered to use superheat, has been 12·14 per cent., while that of quadruple-expansion engines, fitted with superheat over triple-expansion similarly fitted is about 18 per cent. The wear on the machinery is not appreciably increased where proper lubrication of internal surfaces is maintained, and the filtration of oil from the feed water has been successfully carried out, so as to ensure the satisfactory condition of the same, while no danger of oil getting into the boiler need be feared with filters such as were employed. The arrangement and fitting of the superheater elements and pipe connections presented no serious difficulties. The maintenance of the elements in an efficient condition required only ordinary attention, and there was no necessity for additional spare gear or spare superheater elements to be carried. The first cost has been recovered in one year on the basis that the vessel is under steam for 200 days, as a result, not only of the saving of bunker coal, but also of the additional freight carried in lieu of the weight saved thereby. It follows that in subsequent years the whole gain is for the profit of the shipowner, subject to, say, 5 per cent. of same for additional overhaul and maintenance of the superheater elements and parts associated therewith, and the usual allowances for insurances and depreciation on first cost.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE membership of this Institution, as set out in the annual report of the Council, stands at 2,129 at the end of 1913—the membership for the two previous years, being 1912—2,093 and 1911—2,110. The report further states that the Elgar Scholarship for 1914 was awarded last summer to Mr. R. J. Monk, of H.M. Dockyard, Chatham, but on his appointment to an Admiralty Cadetship, the scholarship was given to the second candidate in order of merit, Mr. F. W. Thorne, of H.M. Dockyard, Portsmouth, who is now following the course at the Royal Naval College, Greenwich. The Post-graduate Scholarship in Naval Architecture has this year been awarded to Mr. C. Frodsham Holt, of Liverpool University, where he will carry out research work on the longitudinal and transverse strength of ships. There will thus be three Post-graduate Scholars shortly at work, one in Glasgow University, one at the Armstrong College, Newcastle, and one at Liverpool University, and there is every reason to believe that these scholarships will prove of great value to the ultimate advancement of naval architecture. The annual gold medals and premium for the past year have been awarded as follows:—The Gold Medal to Mr. G. S. Baker, late R.C.N.C., for his paper on "Methodical Experiments on Mercantile Ship Forms." Premiums to Mr. A. Cannon, for his paper on "The Effect of Loose Water upon the Rolling of a Ship," and to Mr. L. Woollard, R.C.N.C., for his paper on "The Effect of Water Chambers on the Rolling of Ships." The movement set on foot last year for the establishment of a permanent memorial to the late Sir William White has met with a satisfactory response from the members of the various institutions with which Sir William White was connected. A general committee has been formed with Earl Brassey as chairman, and a total of over £2,200 has been subscribed or promised; the committee are now considering the form which the memorial shall take.

The result of the election of officers announced at the meeting held on the 1st April was as follows. The Marquis of Bristol, re-elected as president for the ensuing year. Vice-presidents elected for the year—Lord Pirrie, Engineer Vice-Admiral Sir J. Durston, Engineer Vice-Admiral Sir H. J. Oram, Sir Philip Watts, Sir W. T. Doxford, Sir Charles A. Parsons, Sir Archibald Denny, Bt., Sir Wm. E. Smith, Sir John H. Biles, Mr. S. W. Barnaby, Mr. H. J. Cornish, Mr. A. Gracie, Mr. H. R. Humphrys, Mr. J. T. Milton, and Mr. A. F. Yarrow. Vice-president, Col. R. Saxton White. Members of Council—Prof. W. S. Abell, Mr. Charles Buchanan, Mr. J. Gilchrist, Mr. J. Hamilton, Mr. G. B. Hunter, Mr. Summers Hunter, Mr. W. J. Luke, Mr. A. E. Seaton, Mr. H. Rowell, and Mr. W. H. Whiting. Associate members of Council—Prof. W. E. Dalby, Admiral Sir H. B. Jackson and Mr. Alex. Richardson.

The above photograph shows one of the boilers of the new White Star Line steamer "Britannic," 50,000 tons, the largest British steamer, now under construction by Messrs. Harland & Wolff, Ltd., at Belfast, being placed in position. This is a delicate operation, as the boilers—of which there are twenty-nine in all, containing 159 furnaces—each weigh 107 tons. The powerful floating crane also illustrated is capable of lifting 200 tons.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondents.)

Portsmouth Dockyard.

THE large fleet which came into port for Easter leave has now dispersed again to resume its training work at sea and at the various bases around the coast to which the different squadrons are allotted at the various seasons of the year. Portsmouth and Spithead see much less of the First Fleet ships than formerly. New bases more convenient for the changed strategical situation have sprung up at Rosyth, Cromarty, the Orkneys, and other places in Scotland. By the time they have gone through their appointed exercises and drills at these bases, or at Portland, now the southern headquarters, or have calibrated at the ranges at Bantry Bay, there is little time left for the squadrons to spend at their home ports. An illustration of this changed condition of things is to be found in the movement to transfer the Royal Naval War College back to Greenwich, where it was established until November, 1906. When it came here, the routine and organisation of the Fleet enabled a fairly large number of officers to attend the lectures and courses of the College. Now it is found that very few can do so, as even the nucleus crew ships spend a lot of time at sea. Students at the College, moreover, cannot "live in," but when the change to Greenwich is made it is understood that they will be able to do so, more accommodation being available than could be spared at Portsmouth. It is now known that the next new battleship laid down here will be of the *Queen Elizabeth* type, making the sixth vessel of that class. In the original plans of the Admiralty, there were to have been eight of these very fast oil-burning battleships, four being provided by the British 1912-13 programme, one by the Federated Malay States, and three by Canada, but as the last-named have not yet been sanctioned owing to the political deadlock at Ottawa only five are in hand. It is, therefore, decided that one of the four ships in this year's programme is to be a *Queen Elizabeth*, which means that the displacement will be about 27,500 tons, the length 600 ft., and the beam 90½ ft. There will be eight 15-in. and twelve 6-in. guns in the armament, and with turbines of 60,000 horse-power the designed speed will be 25 knots. Surprise has been expressed, especially after Mr. Churchill's bold declaration that the Admiralty had enough oil to meet the needs of the present Fleet for three years of peace or one year of war, that three instead of one of the 1914-15 ships were not made *Queen Elizabeths*. Great interest is being taken in the first presentation of petitions under the new arrangement. The representatives of the four classes of workmen entitled to present petitions in London are being received, the shipwrights on April 29th, the skilled labourers on April 30th, the engine, ship, electrical, ordnance and other fitters on May 1st, and the boiler-makers on May 2nd. The formal petitions were handed in on March 28th, to be forwarded to the Admiralty with the comments of the departmental chiefs. Accordingly when the men's representatives appear at Whitehall—for which they are allowed a day off on full pay and their return fare to London—Dr. Macnamara and his colleagues will already be in possession of the facts regarding the grievances which the men seek to have redressed. These interviews in London are part of the concessions of September last The men hope that the scheme will be a success, so that other classes may in future be granted the privilege of sending deputations to the Admiralty.

Devonport Dockyard.

The trials of the *Marlborough* have now been concluded. So far as any particulars concerning them have transpired, the tests were all carried out in a satisfactory manner, the machinery working smoothly and well and giving the ship a speed at full power of 22 knots, or one knot above that for which she was designed. The vessel is now being fitted out for service in the First Battle Squadron, in which she will relieve the *Collingwood* as flagship. During the trials more has been heard of the grievances of dockyardmen and bluejackets who are employed on such jobs. The former, for instance, have hitherto only been paid extra for the time during which a new vessel has been actually running steam trials. Contractors' men who are employed running trials in a new ship receive extra pay for the whole period that the vessel is out of port. As a result of the agitation of the Associated Society of Engineers, the Admiralty have placed their engineering workmen on the same footing in this respect as the private firms. In future, all men are to receive the allowances for trials from the time the vessel leaves her moorings until she returns after the tests have all been carried out. Another cause of complaint is in regard to the inadequacy of the messing and sleeping accommodation on board ships under trial. Mr. Barnes, M.P., put a question to the Parliamentary Secretary of the Admiralty on this subject in reference to the conditions under which the engine-room artificer staff in the *Marlborough* worked and lived for the eleven days of her recent trials. Dr. Macnamara stated in reply that the conditions under which steam trials are run necessitate a certain amount of inconvenience to all on board, both officers and men, and for several reasons. The arrangements for messing and accommodation can only be temporary, the ship is short of many facilities that exist when she is fully prepared for commissioning, and there are present a large number of officials and men forming the contractor's staff, record party, and the like, in addition to the regular complement. Subject to these facts, he said that he was not aware the circumstances in the *Marlborough* were *exceptional*. This reply of Dr. Macnamara's has a bearing on the larger question of whether it is the best policy to run a warship's trials before she commissions. In Germany the practice is to commission a new ship before the trials begin. Devonport Dockyard is losing its Superintending Civil Engineer, Mr. C. H. Colson, M.I.C.E., who only came to the yard in March, 1913, after more than four years at Dover. Mr. Colson has been lent to the Greek Government for a term of service, and since it is understood that the Greeks contemplate the establishment of a new dockyard with up-to-date equipment and accommodation to meet the needs of their new fleet, he will have a responsible position to fill. It was in response to an appeal from Greece that the Admiralty consented to lend a qualified civil engineer from their Works Department, and Mr. Colson's special experience at Dover makes him well fitted for his new post.

Chatham Dockyard.

A very general misconception about this year's Estimates has been the cause of some disappointment at this yard. The very large sum asked for appeared to indicate a heavy year of work for all the public establishments, and the sums allotted to each yard seem to support this assumption. As a matter of fact, however, as the First Lord explained, the bulk of the money voted is to be used for the purpose of overtaking arrears of work, and these being mainly, if not altogether, in the ships building by contract, it will be expended in the private yards. Moreover, so far as the allocation of work for the year is concerned, while it should provide work during the year, it does not hold out a promise of anything like the amount that has been usual lately in the following year. As a result, so far as it affects this yard, there has been a somewhat unexpected discharge of about 200 mechanics and labourers, and it is apprehended that further discharges may follow. At present, it is true, this does not mean any very serious reduction in the numbers employed, but it is thought a pity that as the people affected are few, the authorities might have seen their way to keep them on. Of course, it is well known that the number of men employed in the yard has been unusually high for some time past, and there have frequently been discharges at this time of the year, but this does not make the disappointment the less felt by those who have to leave and find work elsewhere. Doubtless, a proportion of them will hang on here for a little while in the hope that something may turn up in the way of additional repairs or refits. Meantime, it cannot be said that there is not plenty of work in hand. The three light cruisers, *Arethusa, Calliope,* and *Conquest* are well under way, as are also the submarines, of which a fifth is to be laid down shortly. The *Lowestoft* has now been commissioned, as well as several small craft, including the *Laurel* and the *Liberty,* which have hoisted the pennant for the first time. The *Natal's* refit is finished, and she has left to rejoin the

Second Cruiser Squadron, while the *Commonwealth* follows after recommissioning. The surveying vessels, *Endeavour, Triton,* and *Daisy* have been paid off and recommissioned, and they will shortly resume their duties in the North Sea for the season. Among the arrivals have been the *Queen,* Sir Cecil Burney's late flagship, the *Vengeance,* the *Forward* and the *Blonde.* The *Albacore's* departure was delayed for the inquest on the three men who died from scalds by steam owing to a tube drawing, when the vessel was about to leave for Sheerness. It was stated in evidence that had this mishap taken place at sea the boiling steam would have been driven up the funnel by the fans, and the men would thus have escaped injury. The cause of the tube drawing appears to be unexplained. The three men were buried at Gillingham Cemetery.

Sheerness Dockyard.

Easter leave brought about a large assembly of vessels at this yard, the largest, in fact, since the grand manœuvres of last summer. Thanks to the tranquility of the general situation, most of the squadrons of the First Fleet gave Easter leave at the same time, but the Second Battle Squadron remained fully manned at Portland, and the Third Cruiser Squadron at Cromarty, during the holiday period, their ships giving leave after the other had finished. Even the Fourth Battle Squadron from Gibraltar was able to return home to allow its officers and men to spend Easter with their relations and friends in England. In the week before Easter, the port was visited by the Swedish training cruiser *Fylgia,* which often puts in an appearance at English seaports during her voyages for the instruction of cadets. An important change took place on April 9th, when the battleship, *Lord Nelson,* on being relieved in the Fourth Battle Squadron, hoisted the flag of Vice-Admiral Sir Cecil Burney, commanding the Second and Third Fleets, in place of the *Queen.* The *Lord Nelson* was only launched at Jarrow by the Palmers' Company in 1906, and has therefore passed out of the First Fleet and been reduced to "active commission" with a nucleus crew after eight years' service. Although newer and stronger battleships have been completed in the interval it was thought that the *Lord Nelson* and her sister, the *Agamemnon,* would remain in full commission for some time longer, as the squadron to which they were attached, the Fourth, has only four instead of eight battleships, but Mr. Churchill has explained that the delay in making it up to its nominal strength is due to the delay in the completion of the German Fleet organisation. In common with the other yards, Sheerness has been the recipient of a circular letter directing attention to the slack manner in which some men observe the regulation that work must be begun immediately the bell ceases ringing at each in-muster, and that it must be continued until the bell rings again at the out-muster. The Admiralty are evidently determined to deal firmly with the evil of numbers of men ceasing work before the appointed time. Special efforts are to be made to enforce the regulations, observations being made at the attendances of workmen at the muster station. That the names of the last to arrive at each in-muster, and the first at each out-muster, should be taken regularly, is one of the suggestions in the official circular. Places where workmen change their clothing are also to be carefully watched, and an example made of men who change before the proper time. The order has naturally been received with all sorts of feelings, ranging from amusement to indignation and contempt, but there is no doubt that, coming after the recent additions to the permanent or established list, it should have a salutary effect and promote the efficiency of the yards.

Pembroke Dockyard.

Although there have been a good many workmen employed upon her, the *Corysfort* does not appear to have made the progress that was expected. Laid down in February of this year, her launch will probably be delayed until the autumn, or about six months hence. Even so, she should get off the slips in a shorter time than her sister, the *Cordelia.* In the latter vessel, however, the contractors have been making good progress, and she is now at the jetty in order that her machinery may be put on board. The fear has been expressed that as the wages vote for this year is so much less than it was for 1913-14, a reduction of something like £30,000, it will, therefore, become necessary to reduce the number of men employed in the yard, but as an offer was made to those who had reached the age for retirement to continue their service it does not appear that the authorities contemplate such a measure, at all events for the present. There are signs that less overtime will be worked, and that we may not have so much refitting as has been usual. Another vessel which will be delayed is the *Trefoil,* which as already reported is to be fitted with Diesel oil engines. These are not ready, and the oil-carrier will have to wait for them. This vessel, and her sister, the *Turmoil,* are to be completed during the year, and it is possible that the latter may profit in progress by the postponement of her sister-ship's advancement. The *Nottingham* has been completed and has left for Devonport. Laid down on June 13th, 1912, and launched on April 18th, 1913, the time taken to complete her has been one year and ten months, which compares favourably with the period occupied by other ships of the same class. The conversion of the *Heliopolis* into a hospital ship, when her name will be changed to *Mediator,* is being pushed on, and she has been brought alongside the jetty to expediate the work. This is another ship which should be completed within the year.

"TITANIC" ENGINEERS. SOUTHAMPTON MEMORIAL.

ON the 22nd April, in the presence of thousands of people, the handsome memorial, erected in Andrews' Park, Southampton, to the memory of the engineers who perished in the *Titanic,* on April 15th, 1912, was unveiled by Sir Archibald Denny, the new President of the Institute of Marine Engineers. Among those present were—Col. A. M. Swalm, United States Consul at Southampton; Mr. F. J. Blake, R.D., R.N.R. (Chairman of the Memorial Committee), Mr. Fairburn (President of the Marine Engineers' Association), Alderman H. Bowyer, R.N.R. (the ex-Mayor), Councillor G. Etheridge (Sheriff of Southampton), Alderman C. J. Sharp, Alderman W. E. Bathurst, Alderman H. H. Smith, Mr. P. E. Curry (local manager of the White Star Line), Messrs. W. Brodie, E. H. Dashper, J. F. Douglas, R. Elliott, G. B. Henderson, G. H. Heard, D. Lindsay, A. T. Patrick, F. P. Wallau, J. E. Wimshurst, E. Bullions Moody (Hon. Treasurer), Geo. Catlin (Hon. Sec. Memorial Committee), Messrs. Joseph Hallett (Chairman of Council, Institute of Marine Engineers), Alex. H. Mather (Hon. Treasurer I.M.E.), Alex. Boyle (Vice-President I.M.E.), J. H. Rosenthal (Vice-President I.M.E.), J. T. Milton (Vice-President I.M.E.), John Clark, B.I.S.N. Company, (Member of Council I.M.E.), J. Thom (M.I.M.E.), Sir Jas. Lemon, Messrs. W. J. Marshall (Sec. of Marine Engineers Association), A. Orlton Cooper, R.N., R.N.R., E. W. Kidby (local Sec. M.E.A.), A. B. Dennett, J. W. Jack, G. Blake Henderson, Capt. Harvey (Dockmaster), Capt. C. Cotterell (Harbour-master), Capt. McCarthy (Argentine Consul), H. F. Warren (Mexican Consul).

In formally unveiling the memorial Sir Archibald Denny said that the engineers had by the manner of their death carried out one of the finest traditions of our race. They must have soon known that no pumping could do more than delay the final catastrophe, yet they stuck pluckily to their duty. Driven back from boiler-room to boiler-room, fighting for every inch of draught to give time for launching the boats, not one of those brave officers was saved. Their action might be compared with that of the men on board the *Birkenhead,* but there the soldiers stood together in the open air and in daylight, whereas their

Photo.—Marine Engineer.

Titanic Engineers—Southampton Memorial in Andrew's Park, unveiled by Sir Archibald Denny, Bt.—22nd April, 1914.

comrades worked below to the last and perished in the dark. The speaker's closing words were—"In respectful memory to those brave engineer officers, who, when the *Titanic* sank in deep water, remained at their posts and sacrificed their lives, I unveil this monument that it may be for all time a witness of our gratitude and an inspiration to succeeding generations to tread fearlessly the path of duty."

After the dedication the Last Post was sounded and the monument was formally accepted from Mr. F. J. Blake (Chairman of Memorial Committee) by Alderman C. J. Sharp on behalf of the Corporation. The memorial, which has been worked in Aberdeen granite and English bronze, is of the following approximate dimensions, height 19 feet, length 32 feet 6 inches, and from back to front 14 feet; the central figure is about 7 feet high. The inscription is as follows:—

"Greater love hath no man than this, that a man lay down his life for his friends."—*St. John, xv.*, 13.

To the Memory of the Engineer Officers of the R.M.S. "Titanic," who showed their high conception of duty and their heroism by remaining at their posts.

April 15th, 1912.

[*Left-hand Tablet.*]

Joseph Bell	Jonathan Shepherd
Wm. E. Farquharson	Charles Hodge
Jno. H. Hesketh	Francis E. G. Coy
Norman Harrison	James Fraser
George F. Hosking	Henry R. Dyer
Edward C. Dodd	Renny W. Dodds
Leonard Hodgkinson	Arthur Ward
James M. Smith	Thomas H. Kemp
Bert Wilson	Frank A. Parsons
Herbert G. Harvey	William D. Mackie

[*Right-hand Tablet.*]

Robert Millar	Alfred P. Middleton
William Y. Moyes	Albert G. Ervine
William McReynolds	William Kelly
Henry P. Creese	George A. Chisnall
Thomas Millar	Hugh Fitzpatrick
Peter Sloan	Arthur A. Rous
Alfred S. Allsop	William L. Duffy
Herbert Jupe	

also

Thomas Andrews Anthony W. Frost

Robert Knight.

Erected by their fellow engineers and friends throughout the world.

THE LONGITUDINAL STRENGTH OF A VESSEL.

Continued from page 348.

Modifications for Sagging Condition.

The work for the sagging condition is the same as that for the hogging; we start, however, with different data. The distribution of the movable weights is such as to give the worst condition possible when the vessel is sagging, *i.e.*, the end-holds and peaks are empty, and the centre holds and bunkers are full. Again, the bouyancy curve will take a different form, as, instead of having one hump at the middle of length of the vessel, we have now two humps at the ends and a hollow amidships, as might have been inferred from the contour of the wave at the moment of sagging.

Effect of Heaving.

In all that has been said we have assumed the vessel and the wave to be instantaneously at rest. In reality the heave of the vessel causes her to sink deeper into, or rise farther out of the waves than is the case when the buoyancy is taken as being exactly equal to the weight. This is a refinement

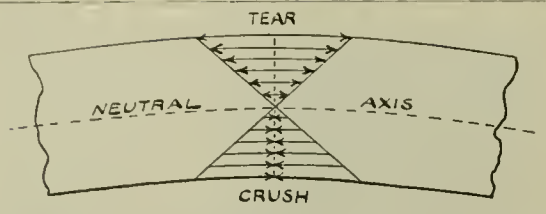


FIG. 8.

which is not worth while going into in ordinary strength calculations, as we will see later that the factor of safety, resulting from the above assumptions as to length and height of wave, is sufficient for all practical purposes.

Having arrived at the value of the maximum bending moment in both the hogging and sagging conditions, we choose the greater of the two and note where it occurs in the length of the vessel.

STRENGTH SECTION.

At the point where the chosen maximum bending moment occurs, we must consider the strength of the vessel; if the strength be sufficient there where the bending moment has its greatest value, we may safely assume that it is sufficient towards the ends of the vessel, as although the strength of the vessel falls off towards the ends, due to thinning down the shell plating, dropping stringers, etc., still it does not fall off as rapidly as does the bending moment, keeping always a balance of strength to the good.

To fix our ideas we will assume that the greater of the two maximum bending moments is that due to hogging, we can then liken the vessel to a beam subjected to a bending moment which curves it as in Fig. 8. Across a section AA we will have the material tending to tear at the upper, and to crush at the lower portion. It might be inferred, as is actually the case, that in passing from a tearing pull to a crushing push we can have no sudden jump from one state to the other, but that the transposition must be gradual as indicated in the figure. It will be noted that there is one point on the section where we have neither tension nor compression, that is a neutral point, and through this passes the neutral axis of the beam.

Turning to our ship. Having the position of the strength section we proceed to draw it, putting in all parts which give

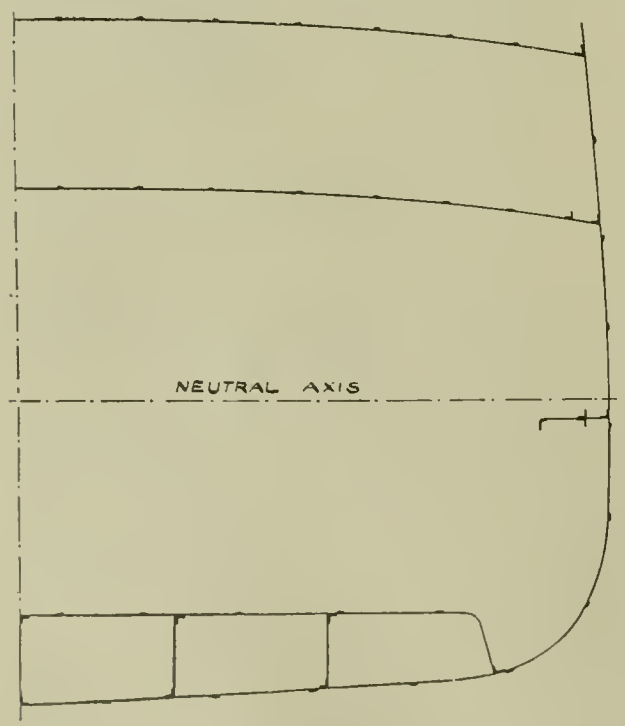


FIG 9

longitudinal strength, that is, all continuous fore-and-aft parts, such as shell plating, deck plating, keelsons, stringers girders, etc., Fig. 9.

We now make use of the formula $p = \frac{y}{I}M$.

where p = the greatest stress in the material, or the greatest resistance to failure by tearing or crushing which the material is called upon to offer. This stress is measured in tons per square inch.

y = the distance from the neutral axis of the part where this greatest stress is experienced; measured in inches.

I = the moment of inertia of the strength section about its neutral axis; measured in inches to the fourth power.

M = the moment of resistance of the section about the neutral axis; measured in tons—inches.

Now the moment of the resistance to being bent, which is offered by the material in the section, must be equal to the bending moment calling this resistance into existence, so that we already know the value of M. The value of y is readily obtained, as it is the distance from the neutral axis of the piece of material farthest removed from that line. The moment of inertia I is more troublesome, as it involves a rather lengthy calculation. Having obtained the values of M, y, and I we can determine p from the equation given above.

FACTOR OF SAFETY.

The value of p may work out to be, say, 10 tons per square inch. Now the material was tested to break anywhere between 28 and 32 tons per square inch; the question then arises, is a factor of safety of from 2·8 to 3·2 sufficient? if it is not, then our assumptions as to the dimensions of the standard wave are incorrect, and must be modified. The only way of checking the factor of safety got above, is to find by experiment the stress in the material under actual conditions, and to compare it with that got from the above

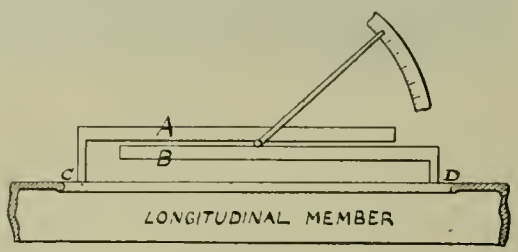


FIG 10

calculations. It is impossible to measure, when a vessel is at sea, the external forces applied to her by the waves, nor is it possible to measure directly the resistances called for in the material when the forces of the waves are acting. However, as within the stress which can be applied to the material without permanent set resulting, stress is proportional to strain, then if we can measure the increase or decrease in length in any member we can arrive at the stress to which it is proportional. This method of arriving at the stress on the strain being known, is applicable in the present instance, as the working stress in the material of a vessel is kept within the elastic limit; in other words, on the stress being removed the part will go back to its original length.

In order to measure the extensions and contractions in various longitudinal members of a vessel when at sea, the Torpedo-boat Destroyer Commission, called to investigate the strength of those vessels upon which doubts were cast when the *Cobra* broke her back in the North Sea, fixed strain-indicators to the desired members. These Stromeyer's indicators were very simple and effective, consisting in the plates, A and B, Fig. 10, the ends of which were attached to two points C and D in the longitudinal member, at a known distance apart. The relative movement of the plates would then give the alteration in the length between C and D, and to magnify this movement, which would of course be very small, a needle was placed between the plates. This needle rolled with the movement of the plates past one another, and the angle turned through by the needle was magnified by a straw attached to its end passing over a circular scale. All that remains to be done is to calibrate the circular scale, so that, for a given movement of the straw, we may know the stress which is giving rise to the strain

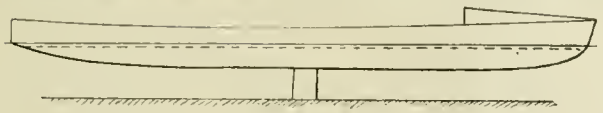


FIG 11

causing this movement. To do this we must apply known stresses to the vessel, and this was done in the case of the *Wolf*, on which the experiments were made by placing her on a central block in a dry dock (Fig. 11). The water was then let into the dock until the vessel was just afloat, when a mark was made where the straw of the indicator rested on the scale; this gave the zero of the scale. Subsequently, water was let out of the dock till the waterline fell from the full to the dotted position shown in figure. A certain amount of buoyancy was then lost, represented by the layer of the vessel which emerged from the water, this lost buoyancy was, practically, added weight, and applied a bending moment to the vessel. This bending moment was known, as, from the drawings of the vessel, it was easy to get the amount of the lost buoyancy, and the point at which it acted, so obtaining the bending moment applied to the vessel. This bending moment caused a movement of the straw along the scale to a new position, which was then marked in terms of the bending moment. By doing this for a number of bending moments a number of spots were got on the scale, and the intervening spaces were divided up in accordance with the marks. The *Wolf* then went to sea and encountered severe weather, during which time the strain-indicators were read, giving a measure of the bending moment acting on the vessel. The maximum of these bending moments was then put into the formula $p = \frac{y}{I} M$ for the vessel, as it was numerically equal to the moment of resistance M of the section. Knowing y and I for that particular section, p was arrived at and found never to exceed 5·38 tons per square inch. Now on making the standard strength, calculations for the "*Wolf*" the value of p was found to be 7·14 tons per square inch, showing that there was a margin of 32¾ per cent. to the safe side in favour of the calculation, a satisfactory proof that reliance can be placed on the results so obtained.

Concluded.

THE CUNARD CO.'S "AQUITANIA."

THE *Aquitania* will take her first sailing from Liverpool to New York on May 30th, and together with the *Mauretania* and *Lusitania*, will maintain the Cunard Line express service between Europe and America. These three magnificent vessels will be the fastest ships forming any express ocean service in the world. Their aggregate tonnage reaches the enormous total of 110,000.

As stated in our May, 1913, issue in describing the launch of the *Aquitania*, the gross tonnage of the vessel is 47,000, and the displacement 55,000 tons, length 901 feet, width 97 feet, and the height from keel to boat deck nearly 100 feet. In addition to the constructional details and other information given in the aforesaid number, we are now able to add some further interesting details of this gigantic liner. It is well on to half a mile walk round the ship from bow to stern and back, and the deck space is equal to that of no fewer than eight football fields. As to width, there is space enough for a broad highway, with room for tramways, passenger and vehicular traffic to pass and repass; Cheapside, one of London's busiest thoroughfares, could easily be placed inside the ship. Nelson's Column, would not by over twenty feet reach the top of one of the huge funnels, each of which is 22 feet by 15 feet diameter, and rises to a height of 164 feet from the keel.

For ensuring the security and safety of the passengers a sufficient number of lifeboats are carried to accommodate all on board, two of them are motor boats, fitted with wireless telegraphy. To give the vessel increased stability, Frahm's anti-rolling tanks are provided, which have proved such a success on the Cunard Co.'s *Laconia*. Accommodation is provided for about 4,000 passengers, nearly 1,000 first, 600 second, and over 2,000 third-class. In addition the *Aquitania* carries a crew of nearly 1,000. Special attention has been paid to the second cabin passenger, whose accommodation has been arranged on a most generous scale, the public rooms provided for him, including dining saloon, smoking room, lounge and drawing room, in addition to a gymnasium and verandah café. The lounge and verandah café are features hitherto reserved for first-class accommodation. The first-class passenger accommodation is arranged on the Cunard Co.'s usual sumptuous scale. The garden lounge is situated on both port and starboard sides of "A" deck and the appearance of an old garden has been given to it by means of trellis in natural teak on walls treated to represent stone. The restaurant is decorated in Louis XVI. style. A magnificent place is the first-class lounge; the centre of the room is eighteen feet high and is ornamented with a genuine old ceiling painting on canvas, signed by Van Cuygen. The first-class smoking room is an adaptation from Greenwich Hospital, of the period of late Charles II. Its length is 76 feet and breadth 52 feet. In addition there are the grill room, drawing room, sitting room and salons, all decorated and furnished in the highest possible manner. A spacious swimming bath forms part of the accommodation.

Electricity on a liner of this magnitude plays a very important part. The electrical power used would light a town of 200,000 inhabitants. The copper cables for electrical current weigh 180 tons and are 400 miles in length. There are on board about 10,000 lamps and 1,100 bell pushes, besides a complete system of telephonic communication between all parts of the ship. Electricity is used for no fewer than forty-two distinct purposes, and the electric power station supplies current to about 200 motors, ranging in size from 60 h.p. for the stokehold fans to ¼ h.p. for knife cleaning.

The normal speed of the *Aquitania* will be 23 knots, which will enable her to leave Liverpool on the Saturday afternoon and arrive at New York early in the morning of the following Friday. She will be propelled by quadruple-screw turbine engines driving four propellers. The total weight of the turbines is nearly 1,400 tons, the blades varying in length from 1½ to 20 inches and numbering over 1,000.000. Each low-pressure turbine weighs 425 tons. For the purpose of going astern, each of the four propeller shafts has an independent turbine. There are twenty-one boilers, each with eight furnaces; if placed end to end with smoke-boxes just touching, they would stretch for about 600 feet and the water they hold when in sea-going trim would fill about 8,250 large barrels.

The double bottom, which is divided into over forty separate water-tight compartments, has a space of 5 feet between, increased to 6 feet under the engine rooms.

The double skin extends for some 500 feet and covers all the most vulnerable parts. The space

between the two skins is 18 feet and it is divided up by bulkheads into comparatively small compartments. There are sixteen bulkheads, extending from side to side of the ship, all of which extend high above the water line.

In giving a last comparison to illustrate the size of this mammoth floating palace, it is extremely interesting to note that the original Cunard fleet of wooden paddle steamers (1840) could have been easily accommodated upon the boat deck of the *Aquitania*. These vessels, which were four in number and named *Britannia*, *Acadia*, *Caledonia* and *Columbia*, were each of the following dimensions—length, 207 feet; breadth, 34⅓ feet; depth, 22½ feet; tonnage, 1,154. They could carry 115 cabin passengers and 225 tons of cargo.

WEST AFRICAN COASTER "ILA."

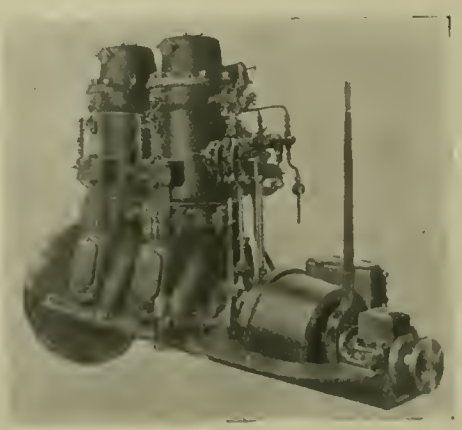
FOR several months considerable interest has been centred upon the shipyard of Messrs. Hawthorns Co., Ltd., of Leith, in which two full-powered motor coasting vessels have been in course of construction, namely the *Ila* and *Ife*, both of which have been built to the special designs of Mr. J. B. Wilkie, M.I.N.A., M.I.Mech.E., Superintendent Engineer to Messrs. Elder Dempster & Co., of Liverpool. This firm originally experimented with these internal combustion engines for their ships' launches, to replace the steam craft then carried by their ocean-going boats, and these launches being so successful, the question of oil engine propelled barges was taken up, with the result that the *Itu*, a vessel, length 59 ft. × 15 ft. × 4 ft., fitted with two sets of Bolinder engines, each developing 25 b.h.p., was constructed to be put in commission on the West African coast, followed by the *Ibusa*, a craft having a length of 55 ft. × 14 ft. × 6 ft., which was fitted with an 80 b.h.p. two-cylinder Bolinder engine.

Messrs. Elder Dempster & Co. then centred their attention on a larger type of craft, the result being the *Ila* and *Ife*, which are sister vessels, with a length b.p. of 135 ft.; breadth moulded, 25 ft.; draught, carrying 300 tons of cargo, 7 ft. The cubic capacities of the holds and hatches of each vessel are close on 18,000 cubic feet, the hatches being of large size so as to carry bulky packages. The scantlings of these vessels are equal to Lloyd's 100 A1 and have been built to pass Board of Trade requirements. The hulls are of Siemens Martin steel throughout and fitted with four water-tight bulkheads. Loading is facilitated by four steel samson posts, which are fitted amidships, each having a separate derrick 32 ft. long and capable of lifting 2 tons by single purchase. The above derricks are worked by two separate winches, driven by a 20 b.h.p. Bolinder engine, special arrangements having been made that, either both the winches can be in use at the same time or separately. A tow hook has been arranged for in a suitable position, as it is quite possible that frequently these may pick up a tow. The windlass is worked by messenger chain from the motor winches. Water ballast tanks are fitted both in fore and aft peaks. The accommodation for the captain and engineer, also a spare room for an agent or passenger, is arranged for on the boat deck aft, the native crew being berthed forward.

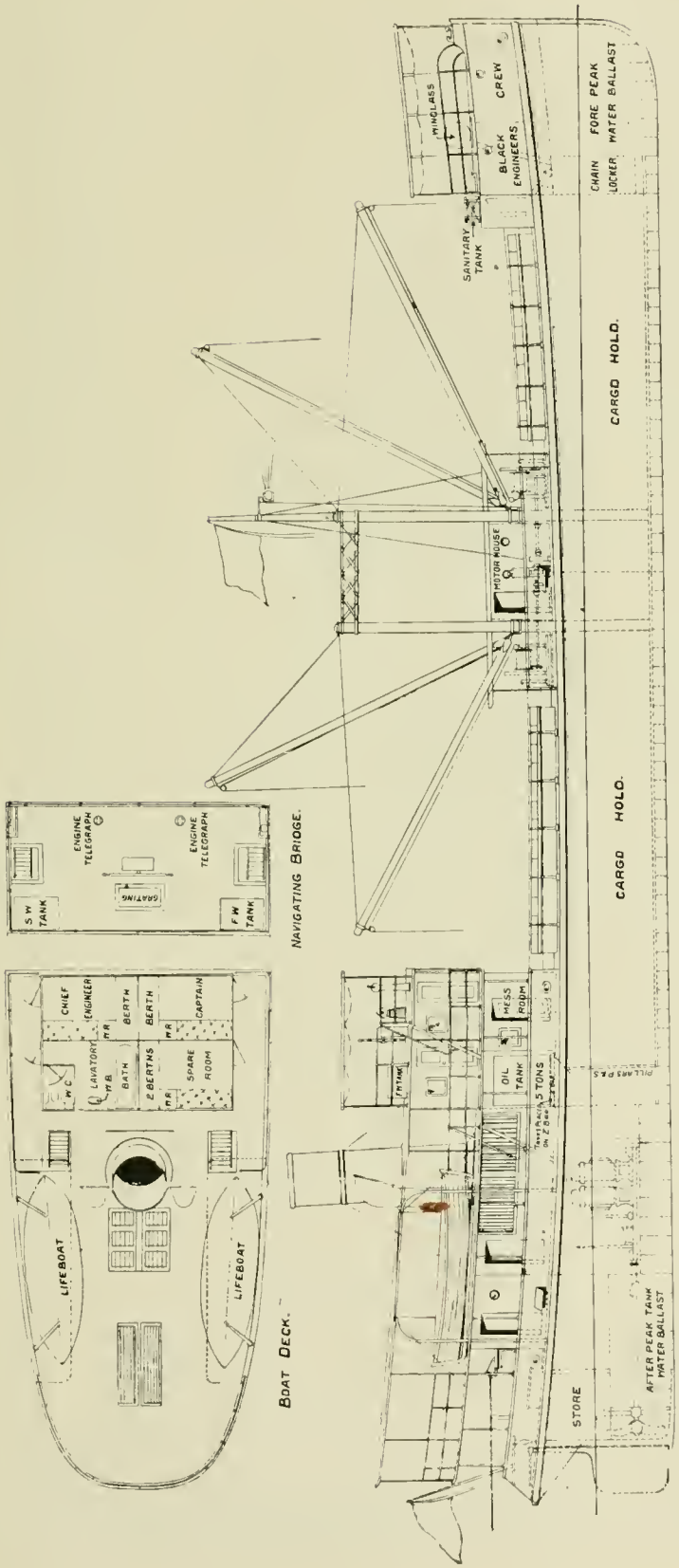
The machinery of each vessel consists of two sets of Bolinder direct reversible crude oil marine engines, each developing 120 b.h.p. at normal load, with a continuous load of 10%, supplied by Messrs. James Pollock, Sons & Co., Ltd., 3, Lloyd's Avenue, London, E.C. The guaranteed consumption with these engines is approximately eight gallons per hour each, but under ordinary working conditions this power engine works on a considerably lower consumption, in some cases as much as 20% lower, even when developing the full load at 275 revolutions per minute. Bilge and service pumps are arranged from each engine, pumping from sea, fore and aft peaks, bilges, and to deliver overboard, also to deck. An auxiliary bilge and service pump, 3 in. centrifugal, direct coupled to a Bolinder engine is installed in the engine room. Fuel tanks, with a capacity of 1,200 gallons, in addition to a daily service tank of 160 gallons capacity with the usual connections to the main tanks, are fitted in suitable positions in the motor room, so as to give plenty of room round each engine.

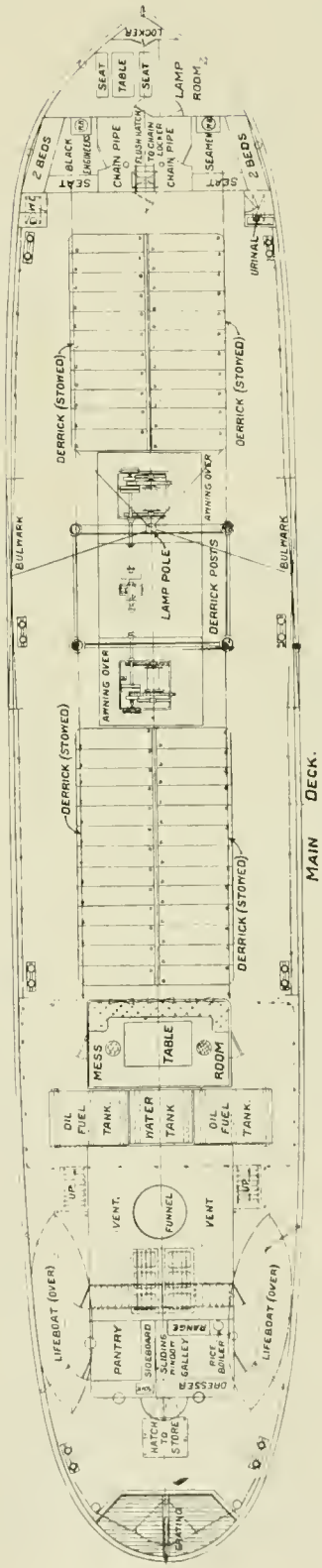
The speed trials of the *Ila* were run at Leith, when the satisfactory speed of just over eleven statute miles per hour was obtained. The vessel was manœuvred and thoroughly tested with such satisfactory results that the owners took delivery of the vessel, after expressing their satisfaction with all the tests that she had been subjected to.

The details of the Bolinder engine are well known throughout the world. The method of starting these large Bolinder engines is exactly the same as with a Bolinder engine of smaller power. A medium-sized wrought-steel cylinder is situated in a convenient position in the engine room. A pressure of about 160 lbs. is kept in this "bottle," which is generally obtained from the exhaust gases from the silencer, but in some cases an air compressor is worked by a pin off the flywheel end of the crankshaft, both systems being entirely satisfactory. This compressed air gives the first impulse to the engine, after which the fuel pumps come into action and the compressed air is not again needed. The time taken for starting is very short and naturally the engine is not heated up until only a few minutes before the vessel is needed to get under way. With a steam engine it is a matter of several hours' work before sufficient steam can be raised to get way on the vessel. It is generally known that the Bolinder engine is direct



Bolinder Crude Oil Marine Engine, b.h.p. 120.
The *Ila* and *Ife* have each two sets supplied by Messrs. Jas. Pollock, Sons & Co., Ltd.





Arrangement of the West African Coaster *IIa*. A sister ship is the *Ife*.

Built for Messrs. Elder, Dempster & Co. by Messrs. Hawthorns & Co., Ltd., Leith.

Dimensions: Length, b.p. 135 feet; Breadth, mld. 25 feet; Draught on 300 tons, 7 feet; Motors—2 sets of Bolinder Crude Oil Marine Engines each set 120 b.h.p.

reversible, but many people confuse the method adopted with that of compressed air. Such is not the case, as the engine is reversed by merely pulling over one lever, without any timing—similar to a steam engine. The change of rotation is arrived at by the automatic cutting out of the fuel pumps, slowing down of the engine and at the right moment —just before the engine is stopped—a reverse charge of fuel is injected, causing the motor to rotate in the opposite direction. After the engine has started to rotate in the opposite direction, the fuel pumps immediately come into action. The time taken in this operation varies between one-and-a-half to three seconds, according to the size of the engine. This method of reverse reduces to a minimum the torsional stresses on the whole line of shafting, as the load is removed before the reverse charge is made, which is not the case with reverse gears or compressed air reverse.

In the course of the present month it is anticipated that the *Ife* will be ready for her trials. Perhaps it is hardly necessary to mention that both these vessels will make the trip to their destination under their own power.

CONSTRUCTIONAL FEATURES OF THE TORPEDO BOAT-DESTROYER "ARDENT."

MESSRS. William Denny & Bros., Dumbarton, have recently handed over to the British Admiralty H.M.S. *Ardent*, a torpedo-boat destroyer of 24,500 i.h.p., one of eight special vessels, for the design of which the firms contracting to build them were responsible to the Admiralty. Other properties apart, the *Ardent* is notable from the fact that she is the first vessel of her type to be constructed for the British Admiralty on the longitudinal principle. Her design, proposed by the builders, was accepted by the Admiralty and developed in detail by the builders' staff in close collaboration with Whitehall. Unlike other vessels built on the longitudinal principle—with widespread, strong, transverse frames and beams, combined with longitudinal framing, and where the frames are scored over the longitudinals in the usual Isherwood design—the frames in the case of the *Ardent* are carried out to the shell direct, and the longitudinals are cut at each frame and bulkhead, being fished at the frames by short pieces of angle passed through holes inside of the line of the shell angles on the deep frames. This produces a very strong combination where the wide-spaced frames, as in this case, are necessarily of limited depth. At the bulkheads the longitudinals are connected by knees on each side, thus dispensing with a great deal of collar work usually associated with destroyers.

The *Ardent* passed through all her trials successfully previous to delivery, except the usual "rough-weather" trials. After a delay of ten days without suitable weather occurring the vessel was handed over. The rough-weather trial has since taken place in ordinary service, the vessel being subsequently docked and examined, when she was found in perfect order. Her local strength will, it is anticipated, be more fully recognised by the results obtained under actual service conditions.

No attempt was made in this, the first experiment in applying the longitudinal principle of construction to torpedo-boat destroyers, to take the fullest advantage of the system in respect of economy of material, but in vessels of destroyer proportions there should be decided scope for development. The credit of introducing the improvements already effected, and, in future, possible, should be made clear at this stage. Messrs. William Denny Bros are licensees of Mr. J. W. Isherwood, of the "Isherwood longitudinal framing system," on which, generally speaking, the construction of the *Ardent* has been based; but in addition to this, constructional features are embodied which have Sir Archibald Denny, Bart., as their author.

SUBMARINE SIGNALLING.

Why Submarine Signals are Required.

EVERY seaman knows how very uncertain signals, both visual and aural are during fog. It will be the common experience of everyone that loud signals, so loud as to be almost ear splitting at a considerable distance, in clear weather, are practically inaudible when there is a bank of fog between the signalling apparatus and the ship. Further, it is now well known that, apart from the action of fogs, the currents which are constantly passing in the air have a very important effect upon the audibility of sound signals. Everyone is familiar with the fact that sound is carried by the wind, from to windward down to leeward; but it has also been shown that there are sometimes pockets of air, as it were, across which sound has great difficulty in travelling. Aviators find considerable trouble from air pockets of a somewhat similar kind. A ship in a fog then is absolutely helpless, unless some means can be found of communicating with her, that is independent of the air; and signalling under water provides such a method. It has been shown that sound travels through water somewhere about four times as fast as through air. In addition there appears to be less interference with the sound waves in water, so far as investigation has gone at present, than in air.

What Sound Is.

Sound, it will be remembered, is a vibration of the molecules of air, the molecules of water or of any other substances through which the sound is passing. The well-known experiment illustrating the action of sound waves, is that of the boy throwing a stone into a pool of still water. The stone creates a series of concentric ripples, which move continually outwards and which form little waves. In the same manner, any source of sound creates waves, ever moving outwards and acting in exactly the same manner as the little waves in the pool of water do when a stone is cast in. The waves move outwards, in circles of increasing diameter, or it would be more correct to say, in spheres of increasing diameter, owing to the fact that the air, or the water, is compressed in front of each wave, the compression being passed on to the next air or water lying outside, and then moving backwards. The greater the original disturbance, that is to say, the louder the sound, the greater is the distance to which it is transmitted. Sound obeys practically the same laws as light; *viz.*, its volume decreases approximately as the square of the distance from the source. It does not obey this law absolutely, under practical conditions, because the sound waves are not often spherical as light waves are; but for practical purposes the above rule is sufficiently near.

It will be evident that if a powerful source of sound can be

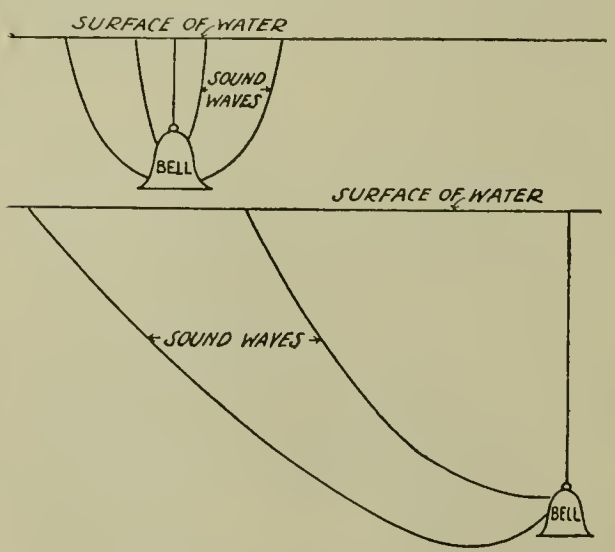


Fig. 1. Showing the greater range of sound waves when the bell is deeply immersed over the range when it is immersed to only a shallow depth.

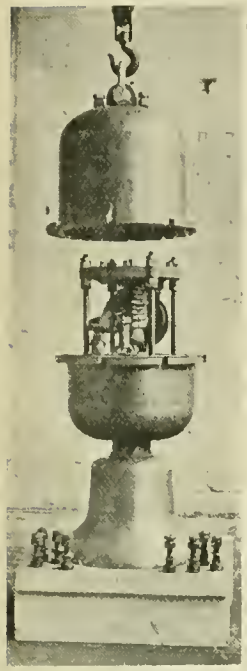


Fig. 2. View of mechanism of Pneumatic Submarine Bell, designed by the Submarine Signal Co.

Fig. 3. Pneumatic Submarine Bell ready to be immersed.

placed in positions that require to be known by the mariner, and the sound waves can be transmitted through the water in all directions, and can be picked up by passing ships, a method of denoting the presence of the different objects, lighthouses, lightships, etc., will have been found. And this has been done. To America, as in so many other cases, is due the honour of having worked out the problem. Up to the present, a bell is the only source of sound that has been able to be used. Prof. Elisha Gray and others in America made very careful experiments upon the best size of bell, and the best form, to give the best results in the matter of transmitting the sound. It will be remembered that every bell, and every mass of metal, or other sounding material, has its own definite note, its own period of vibration. The bell that has been adopted by the Submarine Signal Company, which was formed in America to exploit the apparatus worked out by Prof. Elisha Gray and his associates, and which has a branch with a complete staff in this country, weighs 220 lbs., and has a period of 1,215 vibrations per second, when immersed in water. It should be explained again, that the medium, air or water, in which the source of sound is immersed, has an important effect upon the rate of vibrations. The above number means that 1,215 sound waves are sent out from the bell, per second, each time it is struck; and these waves are transmitted through the water in which the bell lies in every direction, and can be heard by means of suitable apparatus at distances varying from three miles up to fifteen miles and even greater distances. It will be understood again, that as the sound waves pass outwards, they become weaker, very much in the same manner as light waves do. We are all familiar with the fact that the sound is weaker as the distance from the source increases; the reason is, because the same quantity of energy, that is carried by the individual sound waves, is distributed over a very much larger area. The surfaces over which the sound is distributed are spheres, or approximately so.

It is found also that the deeper the bell can be immersed, the greater is the distance at which it can be heard; providing the bell is not placed too near the sea bottom; and further, that the deeper the receiving apparatus, described below, is immersed, the greater is the distance at which the bell can be heard. The fact that a bell is heard at a greater distance when it is immersed to a greater depth, follows naturally from the fact, mentioned above, that the sound waves pass outwards in the form of spheres, or as near to spheres as they can get. When sound waves are emitted by a source of sound, such as a bell, under water, it will be easily understood that they not only pass through the water, as far as the water extends, but they also pass through the air above. As the rate of transmission through the air is so much less than through the water, practically the sound is cut off when the waves reach the air, and therefore when the bell is only immersed to a small depth, the sound waves are cut off very early; while the deeper and deeper the bell is immersed, the greater and greater part does the water take, the farther and farther do the spheres formed by the waves extend, and so the greater and greater is the distance to which the sound is transmitted. Fig. 1 shows this diagrammatically. There is, of course, another limit in shallow waters. No experiments, so far as the writer is aware, have been made upon the rate of transmission of sound by the various bodies forming the sea bottom, but it is probable that the rate is not as great as that of sea water itself, and in addition, there is always the possibility of the sound waves being reflected by the sea bottom, by rocks standing up from the bottom; and so on. It will be remembered again that sound waves obey very many of the same laws as light waves. They are reflected, for instance, in the same manner as light waves are, by certain bodies, the angle at which the sound wave passes away from the reflecting surface, the angle of reflection, as it is termed, being the same as the angle at which the wave enters the reflecting surface.

The Requirements for Transmitting Bell Signals.

Evidently what is required for transmitting bell signals is a bell, suspended at as great a depth as possible, with means for striking clear blows at certain intervals. It will be evident also that by the aid of a modification of the Morse code employed in connection with lighthouses and lightships for varying the light given, so that each lighthouse or lightship may signal its name, each lighthouse or lightship can be made to signal its name by sound. The arrangement for this is described later. There are two principal methods employed for causing the hammer of the bell to strike a blow; *viz.*, by the aid of compressed air and by electricity. There are also other methods employed for use with bell buoys, and for use at the ends of harbours and piers.

The Compressed Air Method.

For the compressed air method, an air compressing apparatus is required, which may be driven by an oil engine, or by any convenient source of power, at the lighthouse, or on board the lightship. The air compressor needs no description;

Fig. 3a. Lightship with Submarine Bell ready for lowering into the water.

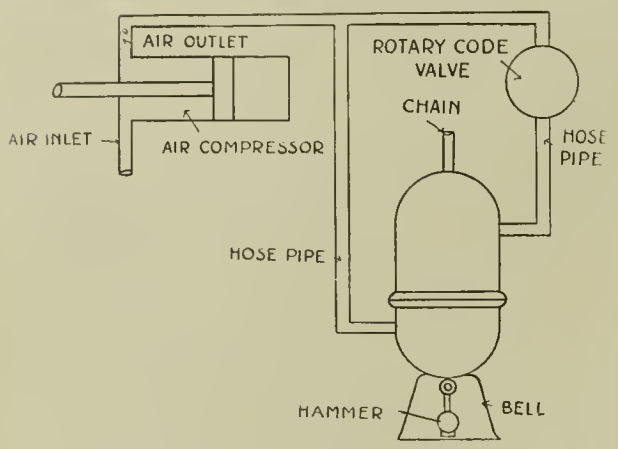


Fig. 4. Diagram showing the arrangement for striking the bell by compressed air.

it is practically a pump, a cylinder into which air is sucked at one stroke, and compressed at the other; the air is forced, on the compression stroke, into a receiver provided for it and it is arranged that the engine and compressor are of sufficient power to maintain the air pressure in the receiver, at the figure necessary to ensure that the blows on the bell shall be struck at the proper intervals, for as long a period as may be required. As with all lighthouse and lightship plant, the air compressor and engine are fixed in duplicate, so that in case of a breakdown of one engine, or one compressor, the other can immediately be brought into service. It may perhaps be mentioned incidentally that the turbo compressor is gradually making its way. It is an adaptation of the steam turbine to air compression. It has the advantage that the air passes continuously through the apparatus, being compressed more and more as it passes through each circle of blades or buckets, instead of its direction being reversed at every stroke. At the present time, the turbo compressor is reported to be not very efficient, but there is every probability that its efficiency will be steadily increased, as with the steam turbine, and it has the great advantage that it takes up a small amount of room. Where there is electric current on the ground, it could be very conveniently applied to driving the turbo compressor.

The Air Compressor Bell.

Mariners will understand well how great have been the difficulties to be overcome in working out an apparatus that would respond continuously to all the requirements. In what may be termed the receiving apparatus, the apparatus carrying the bell to be struck, there is a phosphor bronze cylinder, divided horizontally into two halves. Below the lower half the bell is suspended, the hammer passing up and down through a properly arranged gland. The upper half contains the working mechanism, as shown in Fig. 2 and Fig. 3 shows a complete apparatus ready for immersion; and Fig. 3a shows a lightship with the bell ready for lowering. The whole apparatus is suspended by chains in the usual way, at a depth of about 20 feet below the lightship. Bells of this kind are usually employed for lightships, because there is usually a fair depth of water surrounding them. As mentioned above, the bell is suspended at as low a depth as can be arranged, so that it will not ground at any tide, and so that it is not too near the bottom, and the sound waves will not be interfered with by reflection. A twin rubber hose, properly protected, leads from the compressed air receiver to the apparatus above the bell. One pipe carries air to the lower half of the phosphor bronze cylinder, and the other pipe is connected to what is called the "code valve." The "code valve" is arranged to deliver the compressed air impulses to the bell, at the proper intervals, in accordance with the signal the bell is intended to give. The "code valve" is a revolving arrangement, which allows the passage of air through it at the proper time. The mechanism by which the bell is operated is rather too complicated to be described here. There are two indiarubber diaphragms, to the larger of which the rod carrying the hammer is attached, and the smaller of which works the mechanism in the upper part of the bronze cylinder. When an air impulse passes down through one of the tubes, the smaller diaphragm directs the impulse through the mechanism, in such a manner that the larger diaphragm is lifted suddenly, and with considerable force, the hammer then striking a clear hard blow upon the bell. After the blow is struck the air which has performed its work is allowed to escape to the atmosphere, and the remainder of the air passes into the lower part of the bronze cylinder, which acts as a reservoir of air. A spring causes the small diaphragm to return to its original position, and the large diaphragm also returns to its original position, the hammer and pull rod falling to the place where they are ready for the next stroke. About thirty to thirty-five strokes per minute can be struck, so that it will be seen that it is quite possible to indicate any lighthouse, or any lightship, simply by a given number of strokes of the bell; or as mentioned above, by a modification of the Morse code, a given number of strokes followed by a certain interval, and then a further number of strokes, and so on. Fig. 4 shows diagrammatically the complete air system.

The Electric Bell.

The electric bell is employed more for light-houses, which stand in positions where there is not a great deal of water close to them, and where it is of importance that the signal shall be given at some distance from the lighthouse. Electricity renders itself very conveniently for this work, since currents of any power that may be required, can be delivered at any distance from the lighthouse. But, as marine engineers who have had to do with electric lighting and power plant know, there are considerable difficulties in the way. Sea water is one of the greatest enemies that electrical apparatus has, and therefore the electric bell has had to be specially designed. The mechanism for striking the hammer of the electric bell is contained in a phosphor bronze cylindrical case, divided into two, very much as with the compressed air bell, and the bell itself is suspended below. The whole thing is held vertically by chains, from the centre of a tripod, which is supported by the ground at the bottom of the sea. It is usual to make the tripod 25 feet high from the centre, and to have a spread of about 21 feet. Each leg of the tripod has a heavy cast-iron foot. It will be seen that every detail has been studied, with a view of obtaining the greatest amount of stability. The whole thing weighs three tons complete, without the bell. Great care is necessarily exercised in finding a position for the tripod, where it will stand securely against all the storms which come against it. Seamen know to their cost the enormous force possessed by waves. The tripod, with its bell, is often fixed a mile distant from the lighthouse or headland it indicates. It is lowered into position from a ship having special tackle for the purpose. In comparatively shallow water, up to sixteen fathoms,

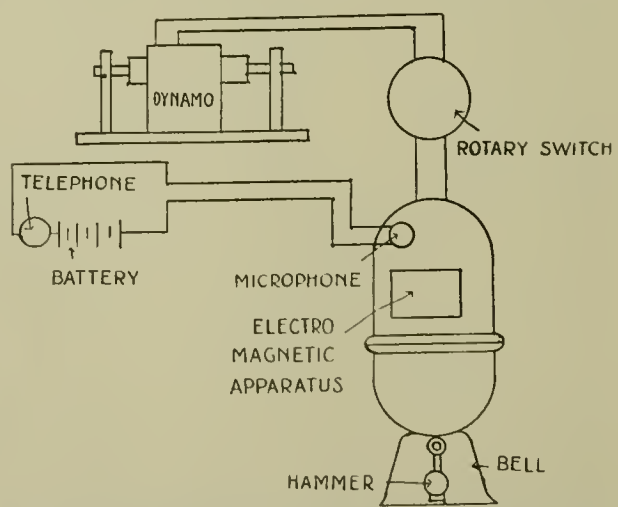


Fig. 5. Diagram showing the arrangement for striking the bell by electricity. The diagram also shows the telephone attached.

a diver is employed to assist in setting the tripod; beyond that depth, no assistance is possible from a diver, and reliance has to be placed upon the lead, and such apparatus as is available for denoting the nature of the sea bottom just there, and for finding a level space to stand the tripod on. The bell employed is exactly the same as that for use with compressed air; it weighs 220 lbs. The operating mechanism consists of six vertically disposed electro magnets yoked together, the ends of their cores being covered by copper, the usual precaution to prevent armatures sticking against them. The armature consists of an iron disc, attached by means of a rod and rocking arm, to the rod carrying the bell hammer. The current is furnished by a dynamo, and is carried to the bell by twin conductors contained in an armoured cable. The cable also carries twin telephone conductors, the use of which will be explained presently. Current is furnished by a dynamo machine, driven by an oil engine, or any convenient source of power; and it is directed to the bell, at the right time, with the proper intervals, by rotary time switches. Marine engineers will be familiar with the electric signs that are so common in almost every town, in which a number of incandescent lamps are alternately lighted up and extinguished. The lighting up and extinction is performed by an automatic switch, consisting of a barrel carrying contacts, which engage with other contacts at a certain period of its revolution. Something similar is fitted between the dynamo and the bell. When the rotary switch closes contact, a current is sent out through the electro magnets, and the iron disc is pulled upwards, over the six electro magnets, with a considerable amount of force, and the motion of the armature is translated into motion of the hammer against the bell by a system of levers. As with the compressed air apparatus, the hammer is made to strike a sharp clear blow and then to return to its position, ready to strike another blow. Fig. 5 shows diagrammatically the arrangement of the dynamo and electro magnets for working the bell. Inside the bronze case containing the operating mechanism is a level indicator, which shows at the generating station whether the bell is hanging vertically or not; and there is also a telephone transmitter, which repeats on a telephone receiver at the generating station at each stroke of the bell.

(To be concluded.)

THE CASTOLIN AUTO-CHEMICAL WELDING PROCESS.

WE have received a copy of the new handbook of the Castolin Auto-Chemical Welding Process, which has been issued by the Castolin Company of Great Britain, of Clock House, Arundel Street, Strand, London, W.C. The process, which is described in this book, is essentially one of welding, but in contra-distinction to many other processes for a similar purpose requiring special skilled operators, the work in this instance can be done by a smith or handyman. Not only is the process applicable to any kind of iron or steel; but most metals in commercial use to-day can be welded by it, each to itself, or to any other. Judging from the illustrations given in the book as to the great variety of work capable of being carried out the process appears to be capable of use with articles of all sizes. For example, ranging from small typewriter parts up to large castings forming parts of engines or machines. It is claimed that the strength of the repaired fractures is greater than the rest of the castings so that a repetition of the break in the same place is not likely to occur. An important factor worthy of attention is that the temperature required is not sufficiently high to involve deterioration of the mechanical or chemical properties of the metal, particularly in the case of iron and steel, as experience has shown in other constructions that high temperature methods of welding inevitably lead to serious deterioration. It is important to bear in mind that no annealing is necessary as there is no distortion set up in the articles operated upon. As some guide of the cost of carrying out the process it is stated that less than twopence per square inch of surface welded may be taken as a reliable factor, while the time occupied in the operation is but little more than that required for properly heating and cooling the piece to be welded. The handbook contains results of tests which have been made on work after treatment by the process and the evidence put forward substantiates the claims to the merits referred to above.

REVIEWS.

Directory of Merchants, Manufacturers and Shippers of the World, 1914. London: Kelly's Directories. Price 36/-.

THIS directory contains over 3,600 closely printed pages (on the vast majority of which as many as 400 names are to be found). It is intended for the use of merchants all over the world, and the headings throughout are given in English and French, and further, also in the commercial language of the country to which any particular section refers. The information given relates to 20,000 foreign and colonial cities and towns and there are a quarter of a million trade classifications given under them. The Indices, consisting of 326 pages, give some 150,000 references and are so complete that by the use of the first index the pages relating to any individual place can be ascertained in a moment, and by the use of the "Index to Trades" a merchant carrying on any particular trade at any particular place can be found with equal facility; and this, too, by both the English and the foreign merchant, as the latter has for the purpose only to make use of the Indices to Trades given in French, German and Spanish. The Directory should be of the utmost value to those anxious to create or extend foreign business relations, as the book is a reliable guide to both the import and export trades of the world, and much information is given in it which is not to be found in any other Directory. The regulations in force with reference to commercial travellers and their samples, which are often both vexatious and onerous, are also fully set out at the commencement of the work. It may be mentioned that the Government has now for many years purchased a large number of copies of this work for the use of the British Consuls in all parts of the world.

Customs Tariffs of the World. London: Kelly's Directories. Price 10/-.

THE 1914 edition of the "Customs Tariffs of the World" extends to over 1,150 pages in double columns. The arrangement of the work is so simple that with the help of the general index and of those given at the commencement of the different countries, the duty on a particular article levied by any particular country can be ascertained in a moment. The book is therefore a really invaluable one for Export and Import Merchants and Manufacturers. It is the most complete work ever published of the various customs tariffs in force throughout the world, and is intended to meet a real and distinct need in the commercial and industrial world. Tariffs are subject to constant alterations and amendments and no year passes without some being wholly remodelled; all amendments as far as possible are shown in the volume. In the present volume, new tariffs among others have been added for The United States of America, Venezuela, Finland, etc.

A Handbook of Wireless Telegraphy. By J. Erskine-Murray, D.Sc. London: Crosby Lockwood & Son. Price, nett, 10/6.

THIS is the fifth edition of the work on the theory and practice of wireless telegraphy especially written for the use of electrical engineers, students and operators, and in view of the fact that the first edition was published some seven years ago, the succeeding editions, particularly the present one under review, have, owing to the advance in electrical science, had considerable additions made, particularly in reference to uniform alternating current and shock excitation systems. The work of this text book is not a mere *rechauffé* of previously published material, but contains a considerable amount of work of an original nature and it is the author's opinion, with which we agree, that if the conception of modern wireless telegraphy given in the first edition had been more quickly recognised by subsequent theoretical writers as fundamental, much time and labour might have been saved in the development of the subject. The present edition is divided into twenty-one chapters with appendices, and comprises nearly 450 pages of descriptive matter which is profusely illustrated with diagrams.

Directory of Shipowners, Shipbuilders and Marine Engineers, 1914. Directory Publishing Co., Ltd, London. Subscription price 5/-, after publication 10/-.

This very useful publication has now made its appearance for the 12th year in succession. A considerable amount of additional information has been included in the volume and for the first time, a distinguishing mark is placed against all ships fitted with wireless telegraph apparatus. The volume follows the usual arrangement, opening with an index of shipowners, shipbuilders and marine engineers alphabetically arranged in order of towns. This is followed by lists of officials of the different departments of the Admiralty, Board of Trade, Lloyd's Register, British Corporation Bureau Veritas, underwriters, etc. The major portion of the book is taken up with the lists of shipowners, shipbuilders, marine engineers and dry dock owners, all alphabetically arranged and giving names of officials, fleets of each line, capacity and output of the shipbuilding and marine engineering establishments and dimensions of docks. The volume closes with a boat index. It will thus be seen that we have here a publication which must be of particular service to those connected with the marine world. The arrangement is very convenient and affords easy reference.

Newcastle and Gateshead Chamber of Commerce Year Book and Commercial Review for 1914. Published for the Newcastle Chamber of Commerce by Sells, Ltd., London. Price 2/6.

THE chief aim of this year book, which is now in its third year, is to give commercial men in other parts of the kingdom and in the colonies and foreign countries, reliable data regarding the resources of the localities dealt with in the publication. Full particulars of the extensive industries carried on in the district are set out and every effort has been made to make the work as complete and comprehensive as possible. Items of historical interest and of the doings of the Chamber during an existence of nearly 100 years will be found in the pages of the year book, and also articles on coal-mining, shipping, iron and steel manufacturing, shipbuilding, engineering, etc. The shipbuilding and engineering firms, as is to be expected enjoy considerable prominence in the publication, and interesting information as to the origination and history of each firm in these and other industries are given. Some very good maps are included of Newcastle, Wallsend, etc., and plans of the Tyne and Wear. A large number of other illustrations are to be found in the book, which is nicely printed and bound and comprises over 250 pages.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

From the Historic Point of View.

THE incident of the month has been the announcement that the famous White Star liner *Majestic* has finished her career. She reached Southampton on the 7th February from what is to prove her last Atlantic voyage, and she has since been sold to Messrs. Ward, of Sheffield. Her fate will no doubt be the scrap heap. The *Majestic* was, of course, the second of the remarkable pair of White Star record-breakers, following as she did the *Teutonic* on the Liverpool and New York station after an interval of a few months. The two ships were in many ways notable. To begin with they were the first vessels built for their trade at Queen's Island to be fitted with twin screws, though twin-screw liners for the mail service were brought out but a little earlier than those for the Inman and International line; but the introduction of the twin-screw principle by no means closed the list of their points of interest. They were built to Admiralty requirements for use as auxiliary cruisers in time of need, and accordingly there were arrangements for protecting the machinery from hostile fire by the use of coal protection, whilst the engines themselves were kept below the waterline. Then there was longitudinal sub-division to minimize, as far as possible, the size of individual compartments. The ships had full twenty knots speed. The *Majestic's* first commander was the well-known Captain Henry Parsell, who brought her across to the Mersey in March, 1890. The following month she accomplished the then fastest maiden passage on record, doing the distance between Queenstown and New York in six days, five hours and a half. On her first eastward voyage she did well, making the crossing in about two hours less than the time occupied by her outward voyage. In July of this year she accomplished a run of 505 miles in a westward day and is said to have not exceeded a coal consumption of 280 tons a day. In September, 1890, she made her first record, accomplishing the run between the mouth of the Mersey and Queenstown in 11 hours 15 minutes. The progress of half a century is well shown not only by the coal consumption just mentioned, but also by the details of this ship's first Christmas voyage. She carried eastward the exceptional number of 1350 passengers and had no less than 1006 bags of mails, being the largest postal shipment ever made in any one bottom, and the weight of her postal matter in April, 1891, is given as 35 tons—an extraordinary figure for those days. In June, 1891, the *Majestic* succeeded in making an average of over 20 knots for a whole westward run. In August of the same year she broke the westward record, which was previously held by the Inman liners and her sister the *Teutonic*. Her time was five days eighteen hours and eight minutes. At the beginning of 1892 over the long route she achieved an average speed of 20·41 knots, taking the record for mean speed from her elder sister. In September of that year she accomplished a still further reduction in the time of passage and brought the total steaming for a day's run up to 520 sea miles.

In looking over the history of this ship a noteworthy fact appears, and one which is of especial interest at the present moment. It is that even as early as the year 1893, on eastward voyages at least, the commanders of Atlantic liners on occasion found it advisable to omit the call at Queenstown owing to unfavourable weather conditions, and so to bring the mails and the Irish passengers right on to Liverpool.

In May, 1894, there was an exciting race between the *Majestic* and her then rival, the *Paris*, on the eastward run. The two steamers left Sandy Hook within forty minutes of one another and for several days "were steaming side by side, not being at any time many ship's lengths apart." The *Paris* had the *Majestic* on her starboard and when it became necessary for her to make somewhat more to the southward for the English Channel, the *Majestic* had to slow in order to let the other vessel cross her bows. In December, 1899, in the black days of the army in South Africa, the *Majestic* with several other important vessels of her class was taken up by the British Government for the rapid transport of troops, some of the earlier ships chartered having been of such a character as to raise a public outcry. In March, 1900, she was back at her Atlantic work. A couple of years later she was off the station for a considerable period, her boilers being renewed and other important alterations taking place. She was last prominent in the public press in October of last year when a gallant rescue in mid-Atlantic was effected by her in taking off the crew from the sinking French schooner *Garonne*. A little while longer and the *Teutonic*, now on the Canadian service of the White Star Line, and the one-time rivals, the *Philadelphia* and the *New York*, must follow the *Majestic*, for all three have now been reduced to the status of second-class ships, and none of them now carry saloon passengers.

The Admiralty Scheme for Arming Merchantmen

has been advanced a stage by the appointment of an officer as inspector for the port of Liverpool of the armaments of those liners which are now fitted with 4·7 inch quick-firing guns. Similar appointments are in contemplation at Southampton and London, the other ports at which important liners centre. It is noteworthy that the new post at Liverpool has been given to an officer of the Mercantile Marine—Lieutenant Richardson, chief officer of the White Star liner *Baltic*, thereby affording recognition and encouragement to the officers of the Royal Naval Reserve.

The Disaster of the Month

has been the catastrophe which has befallen the sealing fleet of St. John's, Newfoundland. Were the tonnage and importance of the vessels concerned to be regarded as the sole criterion of the extent of what has happened, it would seem that nothing more is involved than is unfortunately passing almost every month during the winter in the North Sea and Icelandic waters to the fishing fleets of Europe, for only

three small vessels are affected, and two of them are still afloat. All three are built of wood. The largest is the *Newfoundland*, of 919 tons gross register, built as long ago as the year 1872 at Quebec. Then comes the *Southern Cross*, built in 1886 at Arendal in Norway, and formerly owned by the late Sir George Newnes. She is of 537 tons gross. Finally, there is the *Kite*, of only 280 tons gross. She is also Norwegian-built, having been launched at Brake in 1873. Of these three vessels the *Newfoundland* is still afloat, and yet the disasters were believed to have occasioned the loss of some 325 lives in all! As one of the newspapers has put it, the magnitude of this disaster to the hard-working population of our oldest colony eclipses that of the *Titanic's* loss in relation to the bigger British and American communities. These sealers carry large crews. The *Kite* had sixty-five men, the *Southern Cross* 173 and the *Newfoundland* 120. With many other vessels these ill-fated ships were engaged in their dangerous work in the Atlantic ice, when, on the last day of March, they were caught by a blizzard of unusual severity. The majority of the crew of the *Newfoundland* were away at work on the ice-floes, and, being overwhelmed by the severity of the storm, could not get back to their ship. The survivors of the party were rescued by the sealer *Bellaventure*, which reached the port of St. John's on the 4th April with the bodies of sixty-nine dead and some fifty frost-bitten survivors. In the case of one of the other two ships there are, it is to be feared, no survivors. The *Southern Cross* was last sighted off Cape Race just before the storm set in, and wreckage believed to have come from her was reported by the sailing steamer *Bloodhound* as having been sighted off Cape Pine on the 12th April. The *Kite*, also, was supposed to be lost with all hands, since she had not been seen since the 15th March and wreckage was passed by the steamer *Eagle* on the 9th April some hundred miles from the home port. Fortunately after all hope had been given up it was reported that the *Kite* was safe. A strong appeal has been made to the generosity of the people of the mother country and it would appear that an adequate response will be forthcoming.

The P. & O. Company

points out that it is now four years since its branch service to Australia was inaugurated by the taking over of the business of the old Lund Line, then consisting of steamships aggregating some 29,600 tons. In the four years that have intervened the fleet has been re-organized and practically rebuilt. Only the two best ships of the old line—the *Commonwealth* and the *Geelong*—have been retained, and five new vessels of the Company's "B" class have been constructed and put on the service. The seven vessels, now employed on the long sea route to Australia by the P. & O., total 67,000 tons, and the popularity of the line is increasing as the advantages available become known to the emigrating class.

The New Atlantic Liners.

In the March issue we published a table of dimensions of important Atlantic liners. It may be convenient to repeat the official details of three of the more recent vessels. They are—

Ship.	*Year built.*	*Length.*	*Beam.*	*Gross tonnage.*	*h.p.*
Lusitania	1907	762·2	87·8	31,550	65,000
Olympic	1911	852·5	92·5	46,359	—
Imperator	1912	883·6	98·3	52,117	62,000

Figures, then the best obtainable, were also given for the *Aquitania* and *Vaterland*. These can be corrected as follows:

Vaterland	1913-4	927·6	100·0	58,000	65,000
Aquitania	1913-4	865	97.0	46,150	56,000

The figures are still only approximate, but those of the Cunarder were officially given by Mr. Leonard Peskett in his recent paper before the Institution of Naval Architects last month.

It would appear that the *Aquitania* will compare most nearly in tonnage with the *Olympic*, though she is 13 ft. longer and of 4½ ft. greater beam, and be considerably less than the other big ships. Her fittings, however, promise to be sumptuous, and her art gallery and permanent theatre are attractions of quite a novel type. The "Daily Mail" publishes a remarkable diagram of the *Vaterland* showing a design whereby the uptakes from the boilers, instead of running direct to the base of the funnels up the centre of the ship are led outside near the skin of the ship and brought in under the funnels only at a level above the boat deck.

The Jamaica Service.

There seems at last some possibility that Jamaica may again have a more efficient fruit and passenger service than she has at present. It will be remembered, perhaps, that negotiations with the United Fruit Company went off last year over the Company's desire to have an allotted wharf, which it stipulated should be built entirely at Government expense, though it was indeed willing to pay a fixed rental of £3,500 for its use. Through a third party the Company has now again opened negotiations, and at the same time has announced its intention of again carrying passengers between Jamaica and the United Kingdom.

The St. Lawrence Navigation.

The appearance of the two big Allan liners on the St. Lawrence will be accompanied by a blow to the prestige of the port of Montreal. Owing to the insufficiency of the Channel beyond Quebec it is announced that the *Alsatian* and *Calgarian* will make the latter port the terminus of their St. Lawrence voyages and that the risk of taking them up to Montreal will not be undertaken by their owners. It is intended that no attempt will be made to get these vessels through to the largest city of the Dominion until the Government provides a channel of 35 ft. in depth beyond Quebec.

As time goes on matured criticism points out omissions and weaknesses in the report of the recent

International Conference for the Protection of Life at Sea.

The fendering of lifeboats round the gunwale is not referred to in the report, though experience has shown that there is great danger of an unfendered lifeboat being stove in against the ship's side in course of being launched in heavy weather—a danger which is much increased when the attempt comes to be made to pick her up after performing her service. As the most frequent occasion on which big passenger liners use their boats is when they effect rescues from smaller and disabled vessels, this need of fendering—which is not an expensive process, seems obvious enough. Moreover, cork fendering may possibly be contrived to add to the reserve of buoyancy of the craft.

Though the Great Conference

between the North Atlantic passenger lines, adjourned to Berlin from London was again postponed till some date in May, the *rapprochement* between the Nord Deutscher Lloyd and the Hamburg-American companies has so far been effective that it has enabled the former company to advance its steerage rate by some ten marks. The third-class fare is now £8 8s. by the *Kaiser Wilhelm II.* and the *George Washington*, which are the two most expensive vessels of the company, and some ten shillings lower by the other vessels.

The Announcement

was made the other day, apparently on authority, in view of the strained relations between the Governments of the United States and Mexico, that at three days' notice the Panama Canal could be made capable of giving passage to the biggest warship in the American Navy. This is of great interest. Warships of course, do not draw as much water as the largest class of Atlantic liner. But the larger battleships have draughts which at all events would tax the capacity of the Suez waterway, and so it may be taken that for an ordinary big merchantman the Canal is already a feasible proposition in spite of land slips and of the alleged difficulties in obtaining a due supply of water above the Gatum dam. The question of fuel supply is also engaging attention when the navigation of the canal has become imminent. It would appear that American experts hope that the influence of the Canal will be to displace in certain directions British coal in favour of American, whilst at the same time it is quite possible that for some voyages it will be found that liquid fuel is preferable in point of cost to either. But these points can only be settled by experience, for actual operations are apt to level prices. One thing only seems certain, *viz.*, that if the Canal be anything of a success its effect will be to accelerate the already rapid movement of the sailing ship, pure and simple, without any auxiliary power towards final extinction.

DIESEL ENGINES FOR MARINE PURPOSES.*

MR. MILTON'S paper deals with the principal features of each type of marine Diesel engine and gives as far as possible a statement of the experience with vessels fitted with each of the types and finally some remarks are offered upon the different points which experience has shown to require consideration.

Diesel engines are broadly divided into two classes, *viz.*, the two-stroke and the four-stroke cycle respectively. In both types a cylinder full of air at atmospheric pressure is compressed by the piston till at the top centre its pressure becomes about 500 lbs. per square inch. The compression raises its temperature to about 1,000° F. At this instant a small quantity of oil fuel is blown into the very hot high-pressure air by means of a blast of air at still higher pressure. The arrangement of the fuel valve and its gear is such that the oil is broken into a fine spray, and its admission lasts only for the short time which it takes for the piston to perform about one-tenth of its downward stroke. During this short time much of the oil becomes burned in the hot air. The heat generated by the combustion raises the temperature considerably, and consequently must increase either or both the pressure and the volume occupied. What is aimed at is that the combustion should proceed at the critical rate which would permit the increase of volume occupied due to the motion of the piston and the increase of temperature to be so balanced that the pressure will remain constant until the whole of the oil has been burned. After this the expansion of the hot gas will still further push the piston down, and the pressure will rapidly decrease. The temperature will also rapidly fall, mainly through the conversion of some of the heat into work, but partly also by some of it being conveyed into the cylinder surfaces, these being kept comparatively cool by water circulation. The maximum temperatures actually attained in the cylinders are very high, approximating in some cases to nearly 3,000° F. It is these excessively high temperatures which occasion some of the special difficulties of Diesel engines. It is necessary to keep the rubbing surfaces of the metal, which is exposed to the hot gases, sufficiently cool to permit of their retaining their lubrication, and it is also necessary to prevent all the metal with which the heat comes into contact from becoming so overheated as to damage its strain-resisting properties.

The foregoing remarks apply to all types of Diesel engines. In the case of the two-stroke cycle engine, just before the completion of the expansion stroke the piston uncovers some ports in the lower part of the cylinder walls leading into an exhaust passage, and a considerable portion of the hot gas escapes, the pressure falling to about that of the atmosphere; then in some designs some valves in the cylinder cover are opened, and fresh air supplied by the scavenge pump at a pressure of about 4 lbs. per square inch blows out the remainder of the burnt gas, leaving the cylinder full of fresh air ready to be compressed by the return stroke of the piston. In some designs the exhaust ports are placed on one side only of the lower end of the cylinder, and on the other side similar ports, also opened by the travel of the piston but at a somewhat later instant, admit the scavenge air. In these cases the tops of the pistons are curved to direct the entering air upwards, and it is claimed that the scavenge air travels right to the top of the cylinder and entirely displaces the burnt air. In these latter designs the scavenge valves and the gear for working them are dispensed with, and consequently the engines are to some extent simplified. In the "Junkers" engine, which is another type of the two-cycle engine and which will be referred to later, there are two pistons working in one cylinder. The exhaust ports are disposed round one end of the cylinder and are controlled by one piston in the manner first described, while the scavenge ports are placed at the other end and are similarly controlled by the other piston. The scavenge air in this case sweeps straight through the cylinder, as it does in the type of engine with scavenge valves situated in cylinder covers.

In the four-stroke cycle engine the exhaust takes place through valves in the cylinder covers, the gases being pushed out by the piston on its return stroke. During the next stroke fresh air is drawn into the cylinder through other valves also situated in the cylinder cover. It is compressed during the third stroke, and the fuel is then admitted in the same manner at the commencement of the next stroke as in the two-stroke cycle type. It will be observed that in the two-stroke cycle there is one impulse in each cylinder every revolution, while in the four-stroke cycle there is only one impulse per two revolutions, so that with the same diameter of cylinder and the same piston speed double the number of cylinders have to be used with a four-stroke compared with a two-stroke engine of the same power, if the same mean pressures are maintained. In both types a considerable part of the energy exerted during the impulse stroke is used up in the following compression stroke. Also in the two-stroke cycle large scavenge air pumps have to be provided having an aggregate capacity greater than that of the whole of the cylinders, and considerable power is expended in working these pumps, and this must be taken off the effective power of the engine.

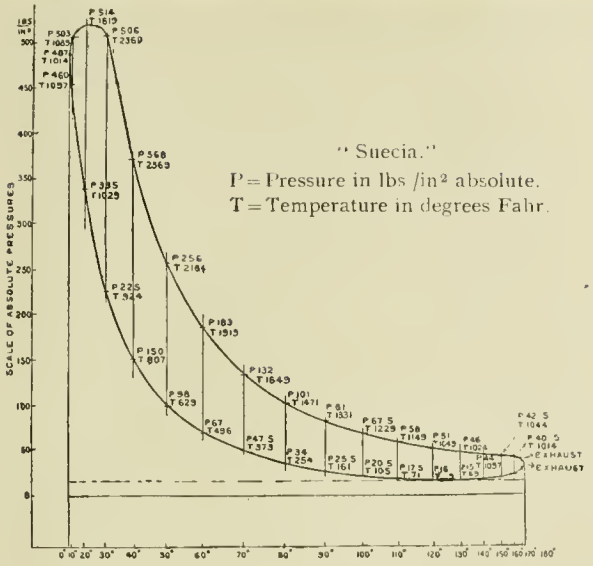
On the other hand the four-stroke cycle engine has the engine friction (pistons, guides, shafts, etc.) during twice the number of strokes as compared with the two-stroke cycle, and it also has to be provided with exhaust valves and gear to work them which are not required in two-stroke cycle engines. On the whole there is no doubt that while the "indicated" power obtained from a stated quantity of oil is about the same in both types of engines working under similar conditions of compression and fuel supply, the four-stroke cycle is somewhat more efficient than the other in that a larger proportion of the power exerted on the pistons is transmitted to the screw, owing to no scavenge air having to be supplied.

In land Diesel engines there are no piston rods, and consequently no piston rod guides. The pistons are made in the form of trunks. They are fitted with fixed gudgeons upon which the connecting rod top ends work, and the sides of the trunks rubbing on the cylinder walls form guides for taking the side thrust of the connecting rods. This form has not found favour with marine engineers, only one large vessel, *viz.*, the *France*, being fitted with this type of engine. In her case the engines were made by Messrs. Schneider, of Creusot, from designs by Messrs. Carels Freres. In all other large marine Diesel engines the pistons have been fitted with piston rods, the lower ends of which are arranged with guides. Special forced lubrication has always to be arranged for providing a small but continuous supply of high-class mineral oil for lubricating each piston in its cylinder. In some cases the engines have all the other principal working parts lubricated by a circulation of oil under pressure, and in consequence these parts are all enclosed in a casing for containing the splash oil, which is collected, filtered, and cooled, and can then be used over and over again. Other engines are lubricated in the manner commonly employed in marine steam engines, and are made of the "open" type. Each style has its advantages and disadvantages as compared with the other. All Diesel engines require to have compressed air for manœuvring and for blowing in the fuel. The air for both of these purposes has to be supplied by special compressors. Of these there are several types. In most cases, but not in all, the air for manœuvring is stored at a lower pressure than that which is required for fuel injection. This is generally considered to be the preferable method. It certainly is much safer, as the manœuvring valves must be arranged to permit the air pressure to be carried for a considerable part of the stroke, and it is not prudent to have to depend only upon wiredrawing the air to prevent an excessive amount of air pressure entering the cylinder and unduly straining the mechanism. Besides, a comparatively low and therefore safe air pressure is capable of doing all that is required.

In Messrs. Burmeister & Wain's engines of the *Selandia* type, the manœuvring air is taken from low-pressure reservoirs which are charged by two-stage compressors worked by auxiliary Diesel engines. A high-pressure compressor worked by each main engine also takes its supply from the same reservoirs, and further compresses air into other receivers from which the injection air is taken.

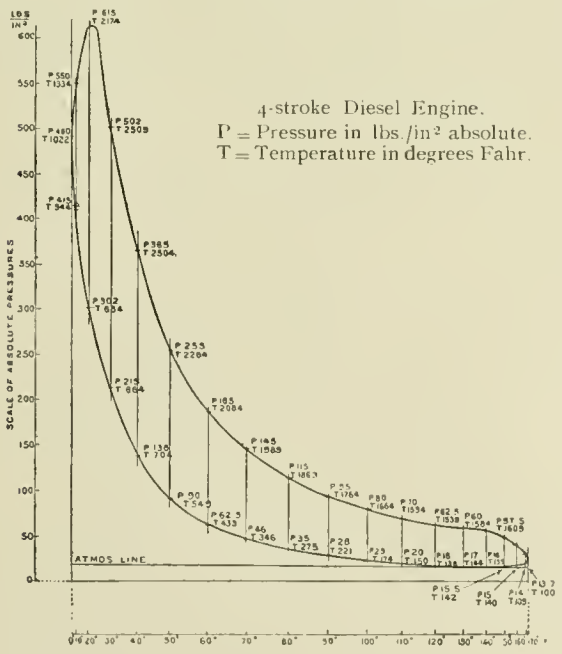
In the "Werkspoor" engines the main compressors are of the three-stage tandem type worked by levers from the

*Abstracts from a paper by Mr. J. T. Milton, read at the Spring Meetings of the 55th Session of the Institution of Naval Architects. April 2, 1914.



Crank Angles. Fig. 1.

main engines. In the engines made by Messrs. F. Krupp and Co., at Kiel, the compressors are of the Reavell type, worked by auxiliary oil engines and not by the main engines. In the engines of the *France*, which are of the Carels type, the compressor is a three-stage tandem, worked direct from the main engine by a special crank and connecting rod. In the engines of the *Fordonian*, *Eavestone*, *Wotan* and *Rolandseck*, all of which are also of the Carels design, the compressors are of the Reavell type, worked by the main engine. In the Nurnberg design of engine for cargo vessels, the compressor is tandem three-stage, worked by levers from the main engine. In the *Monte Penedo*, the engines were made by Messrs. Sulzer Bros., of Winterthur, and the compressors are also three-stage tandem, worked by levers from the main engines. In all cases auxiliary compressors have to be provided for in addition to the main compressors. These are necessary both as a stand-by in case of derangement of the main compressor, and also for supplying the extra air required for manœuvring the engines when entering docks, picking up moorings, etc. It will be seen that there is a great diversity both in the types of compressor and in the methods of working them. The consensus of opinion amongst marine engineers now is that in all cases of engines of small or medium power it is best to arrange the main compressors and also the scavenge pumps, where these are required, to be worked by the main engines; but in engines of large powers, in which the power required to work these accessories is considerable, it will become advisable to have them independent of the main engines, to enable the sizes of the cylinders of the main engines to be kept as small as possible. This is due to the recognised fact that the difficulties inherent in the Diesel engine become accentuated with increase of diameter of cylinder.


4-stroke Diesel Engine.
P = Pressure in lbs./in² absolute.
T = Temperature in degrees Fahr.
SCALE OF ABSOLUTE PRESSURES
ATMOS LINE

Crank Angles. Fig. 2.

A special feature of the engines made at Stockholm and also those made by Messrs. Swan, Hunter & Wigham Richardson, of Wallsend, and by Messrs. Benz & Co., of Mannheim, is that the mechanism of the scavenge pumps is used for manœuvring the engines. In most of these engines there are two pumps which in ordinary running supply the scavenge air. These are worked by a supplementary crank shaft in line with and connected to the main crank shaft. This supplementary shaft has two cranks at right angles. The scavenge pumps are double-acting, and the arrangement provides a fairly uniform supply of scavenge air. When the engines have to be manœuvred by compressed air no scavenge air is required and these scavenge pumps virtually become working cylinders for driving the shaft. They are supplied with compressed air from the receivers and work in a manner similar to that of a two-cylinder double-acting steam engine. In the largest engines made at Stockholm, fitted in the *Sebastian*, the arrangement is that there is one scavenge pump immediately below each working cylinder, its piston being connected to the working cylinder piston rod. As in the other design the scavenge pistons, acted upon by compressed air, are used for manœuvring. The "Junkers" engine has been mentioned as being one of the types of two-stroke cycle. This has been made in two forms, the simple and the "tandem."

In the simple Junkers engine the cylinder is made open at both ends and has two pistons fitted in it. The crank shaft has three cranks for each cylinder. The first and third are in the same phase, the second, which is between the other two, being opposite to them. The bottom piston has a piston rod which is fitted with a guide, and its connecting rod connects it in the usual manner to the central crank pin. The upper piston has its rod passing out of the top of the cylinder and connected to a guided crosshead. Side rods connect the ends of this crosshead to side connecting rods, which work upon the two outer (1st and 3rd) crank pins, the top ends of these connecting rods being guided similarly to the upper end of the centre connecting rod. The arrangement is such that the two pistons work in opposite directions in synchronism in such a way that they are both at the centre of the cylinder when the middle crank is at the top centre, and both at the ends of the cylinder when it is at the bottom centre. As has been mentioned, the scavenge air ports are at one end and the exhaust ports at the other end of the cylinder, both being fully uncovered by the two pistons at the instant when the pistons are at the ends of the stroke. The only valves required in each cylinder are the fuel valve and the air starting valve and a relief valve, all of which enter the cylinder at the middle of its length.

There are certain advantages claimed for this engine, the principal being that in proportion to the effective stroke (sum of the strokes of two pistons) the engine requires less height than any other type of Diesel engine. Also there are no cylinder covers required, parts which in some engines have given considerable trouble, and, there being no covers the gas in the cylinder does not lose so much heat to the cooling water, and a higher heat efficiency is therefore obtained. The valve gear is reduced to a minimum. The bending strain on the crank shaft is very much less than in an ordinary Diesel engine of the same power, and consequently a smaller shaft can be used. There are very small loads on the main bearings, and therefore there is a minimum of shaft friction. On the other hand there are three connecting rods and their accompanying rods and guides instead of one, although each one is much lighter, three crank pin brasses to lubricate, and there are also the guides of the side rods requiring attention. In the "Tandem" type a second

cylinder is provided in line with, but above the lower one. This also is provided with two pistons. The lower is connected to the same crosshead as the upper piston of the lower cylinder, and works in unison with it. The upper piston is connected to a crosshead in a plane at right angles to that connected to the middle pistons, and this is connected by side rods to the guide of the lowest piston of the lower cylinder. The arrangement provides that the pistons of the upper cylinder are at the centre of their cylinder when those of the lower cylinder are at the ends of their stroke and *vice versa*. By this means the pair of cylinders with their four pistons produce the effect of one double-acting cylinder, whereas, when only one cylinder is used, the action is that of a single-acting cylinder. As the impulse stroke of the upper cylinder occurs during the compression stroke of the lower and *vice versa*, the effect of the two cylinders in tandem is to obtain double the power of the one cylinder without increasing the maximum strain on the crank and other shafts.

The Junkers engine in its tandem form has been made by the Weser Company, of Bremerhaven, for a vessel owned by the Hamburg-Amerika Company. They have, however, not yet been tested at sea. The simple form of engine has been fitted in the *Arthur von Gwynner*, which commenced working at the beginning of January of this year.

Another form to be mentioned is the double-acting two-stroke cycle engine. It is rumoured that large engines of this type have been, or are being, made for foreign warships, but so far none have yet been fitted to merchant vessels. The M.A.N. Company, of Nurnberg, in conjunction with Messrs. Blohm & Voss, made some three-cylinder engines of this type for a merchant ship. The set made at Nurnberg was unfortunately destroyed by a fire which followed an accident at the works. At the present time Messrs. Blohm and Voss have in hand some engines of this type for a twin-screw vessel. These have been successfully run on the test bench, but not yet tried at sea. Their performance will be watched by marine engineers with much interest, as they occupy so much less space than any other type of Diesel engine. Being double acting they give the same number of impulses per cylinder per revolution as are obtained in a steam engine, and are thus in marked contrast with the four-stroke cycle single-acting type.

From the point of view of a registration society, as well as of a shipowner, reliability under the conditions of ordinary service is of the first importance, questions of economy of running and of upkeep becoming relatively of secondary interest, although they are still very important to the shipowner.

Dealing with economy of running in the first place, it may be mentioned that whereas in special trades a constant supply of one uniform quality of oil can be obtained, it is necessary for the success of the engines in general that they shall be able to use the particular quality of oil which may be obtainable at any of the ports to which the vessel trades. Dr. Diesel always maintained that any oil which would burn without leaving a residue could be used as fuel in these engines; and it may be of interest to know that Professor Junkers has experimented with several kinds of oils, some of which were considered by some engineers to be unsuitable for use owing to the large percentage of asphalt or unevaporable hydrocarbon they contain, and he has found them to burn perfectly satisfactorily when they are properly treated.

Some of his results are as follows:—

In all the cases quoted the experiments were made on the same engine, which is a small experimental one, with cylinder diameter of 8 in. and a piston stroke (each piston) of 16 in. At 200 revolutions the normal load is 150 B.H.P., but arrangements are made by which an overload up to 220 B.H.P. can be obtained with the same number of revolutions. The overload is obtained by so obstructing the exhaust that the scavenge air imprisoned in the cylinder at the commencement of the stroke is above the atmospheric pressure, and at the same time more fuel oil is injected during the impulse stroke; in other words, more fuel and more oxygen to burn it are used at each stroke. Of course with the greater amount of air used a higher compression pressure is reached, so that the stresses on the engine are also increased when working with an overload.

Professor Junkers points out that, the engine being an experimental one, and the first of its type to be made, the results obtained must not be considered to be the most favourable attainable with oil engines; but, as the trials with different oils were all made on the same engine, and under the same rigid supervision, the results with the various fuels can be considered to be reliable for comparison with one another. In all cases the trials were very prolonged.

The following table shows some of the results obtained. It will be seen that throughout the trials recorded the mean indicated pressure was very high, in no case being less than 10 atmospheres (142 lbs. per square inch), which very considerably exceeds anything which has been obtained with large marine Diesel engines, and that this high mean pressure was obtained with a maximum pressure of 47 atmospheres against 35 atmospheres usual in marine work. It must be mentioned, however, that trials were made showing that with each kind of oil used the engine worked well with low loads as well as with these high loads. It is worthy of remark that with the very high mean pressures obtained during the overload trials, the terminal pressure was very high, in some cases being above 70 lbs. per square inch, and consequently much energy must have been lost in the exhaust, yet the thermal efficiency was practically the same as at normal power. Incidentally attention may be drawn to the

	Mexican Crude Oil.	German Coal Tar Oil.	Gas Oil.	Pacura (Roumania).	Mazut (Russian).	Californian Residue.	
						Brand K.	Brand L.
Carbon	83·21%	90·12%	86·98%	—	85·67%	84·00%	84·78%
Hydrogen	11·32	7·09	12·15	—	12·13	11·07	11·85
Sulphur	2·43	0·63	·71	—	·05	·87	·84
Oxygen and Nitrogen	2·90	1·66	·16	—	·72	3·93	2·45
Incombustible	·14	·50	—	—	1·43	·13	·08
Specific gravity	·937 at 12°C.	1 065 at 15°C.	·85 at 15°C	·90 to 98	·9 at 12°C.	·864	·935
Viscosity	4·11 at 64°C.	1·66 at 20°C	1·14 at 20°C.	—	19·96 at 20°C	6·41 at 80°C.	2·22 at 80°C.
Asphaltum	45·6%	—	—	—	—	48·1%	12·9%
Calorific Value in B.T.U.'s per lb	17,460	15,950	18,000	—	17,800	17,400	17,550
Flash point	—	98°C.	80°C.	140°C.	113°C.	Ignites in at 137°C.	open dish 85°C.
						Average Results of Californian Oil.	
Normal load revolutions	200	200	200	204	200	200	
Brake H.P.	145·2	144	160	—	—	151·8	
Ind. mean pressure	10·0 At.	10·0 At.	10·5 At.	11·0 At.	11·0 At.	10·6 At.	
Max. pressure	44·0 ,,	46·0 ,,	—	40·0 ,,	47·0 ,,	47·0 ,,	
Thermal efficiency	44·3%	45·0%	48%	46%	46·5%	44·7%	
Overload revolutions	200	200	—	—	—	200	
Brake H.P.	212	—	—	—	—	197	
Ind. mean pressure	13·9 At.	13·6 At.	—	—	—	13·2 At.	
Max. pressure	71	64 ,,	—	—	—	73 ,,	
Thermal efficiency	42·8%		—	—	—	44·1%	

differences between the brands K and L of Californian oil, in which it will be seen that the oil with the higher specific gravity has less viscosity, less asphaltum in its composition, and ignites at a much lower temperature than the lighter oil. It has been mentioned that what is aimed at in the Diesel engines is that the combustion should proceed at the critical rate which would permit the increase of volume occupied due to the motion of the piston to be so balanced by the increase of temperature due to the combustion of the fuel that the pressure will remain constant until the whole of the oil has been injected. This ideal condition is, of course, never obtained with any kind of oil, with any form of sprayer, or with any degree of compression.

In general terms it may be said that the hotter the air into which oil is sprayed, other conditions remaining the same, the more quickly will combustion take place. Also the smaller the particles into which the oil can be divided by the sprayer the larger will be the aggregate surface exposed and the quicker will be the combustion. Again, the less viscosity the oil has the more easily it becomes finely sprayed, and further, the greater the excess of pressure of the blast above that of the compression, the more quickly will the quantity of oil measured out per impulse into the fuel valve casing be blown into the cylinder, and probably also the finer will be the spraying. Then, again, some oils contain more of the lighter, highly inflammable hydrocarbons than others, and therefore they will more readily ignite and burn more quickly than the heavier oils, and again some oils are capable of being completely vaporised, whilst others, generally spoken of as having an asphalt basis, consist partly of evaporisable components and partly of hydrocarbons which will not evaporise and are generally called asphalts. As has been mentioned, it has sometimes been considered that these latter oils cannot be used in Diesel engines, but Professor Junkers' experiments show that this is a mistake. It will be thus seen that there are many conditions of detail in connection with the ignition which afford scope for skill and ingenuity. In no case can the combustion fully realize the ideal condition. The nearness or otherwise of the approach to it can be ascertained by a careful analysis of the indicator diagram. Such analyses always show that some combustion takes place along the whole of the stroke. When the combustion is far from perfect at the end of the stroke the exhaust will show smoke. A less imperfect combustion may leave carbonaceous deposits in the cylinder, which in time may so accumulate as to cause the piston rings to seize or become inoperative. Although there may be no smoke, part of the fuel may be burned only to CO instead of to CO_2, and, even if the combustion become actually complete before the end of the stroke, the ideal condition will not be obtained. What is wanted is that the heat should be produced early in the stroke, so as to give full opportunity for its conversion into mechanical energy. To show what may be done in this way one may compare the results obtained with an early four-stroke cycle Diesel engine, fig. 2, with that obtained more recently with the four-stroke cycle engine fitted in the *Suecia*, fig. 1. The diagram in the latter case was kindly supplied by Messrs. Burmeister & Wain, of Copenhagen, and is the mean of a large number of diagrams taken with these engines.

In obtaining the actual temperatures of the cylinder contents at any instant throughout the stroke, we know that at the completion of the suction stroke the cylinder and its clearance have been filled with air at a pressure slightly less than that of the atmosphere. The precise pressure cannot be measured with sufficient accuracy from an ordinary diagram owing to its small scale; but, through the kindness of Messrs. Burmeister & Wain, and also of the Nederlandsche Company, of Amsterdam, I have been supplied with diagrams taken with weak springs. These only show completely the exhaust and suction strokes, as owing to the scale of pressure the compression and impulse strokes cannot be shown on the cards, but the exhaust and suction pressures can be measured with precision. From these cards it is seen that in ordinary working conditions the pressure of the air in the cylinder at the commencement of the compression is a little less than that of the atmosphere. We next want to know its actual temperature at that instant. There is no means of measuring this, but from the considerations given in the Appendix, which gives in detail the methods of calculation employed in the two cases taken as illustrations, a very fair approximation to the actual temperature can be arrived at. The assumption is made that the temperature at the commencement of compression is 100° F. From this point the ordinary laws relating to pressure, temperature, and volume of gases enable the average temperature of the gas in the cylinder to be determined at any instant, if the indicator card is a correct representation of the pressure and volume at that instant. The only special matters to remember in applying these laws to the engines of to-day are, first, that during the impulse stroke the quantity of air has been augmented beyond that shown in the compression stroke by the amount of blast air used per stroke, and, secondly, that while no change occurs in the volume of gas produced by the burning of the carbon of the fuel into CO_2, there is an increase of volume due to the combustion of the hydrogen into H_2O.

If at the point at which the pressure commences to fall the combustion were complete, and if also no heat were abstracted from the gas by the cold cylinder walls, the expansion would be adiabatic, the only loss of temperature of gas being due to the work it does during expansion. If there is a loss of heat through the cylinder walls, as of course there must be, but at the same time no combustion, the temperatures and pressures would, during expansion, fall below those due to adiabatic expansion. An examination of the two diagrams, however, will show that the actual pressure line, instead of falling below the adiabatic expansion curve, rises considerably above it in both cases. This shows that there must be so much combustion proceeding all along the stroke as to more than make up by the heat so produced for that lost by entering the cylinder walls. In the diagram of the earliest engine this takes place to such a marked extent that towards the end of the stroke the temperature is seen to be actually rising, so that the combustion here more than makes up for the waste through the cylinder walls, and also for the heat which is at the moment being converted into work.

Attention is now drawn to the marked difference in the temperatures at the latter end of stroke in the cases of these two engines. Even making very large allowances for the fact that in the earlier engine the mean pressure is so high as 114 lbs. per square inch, whilst it is only 88 lbs. in the case of the *Suecia* it will be seen that in the latter the terminal temperatures are much lower. This must have a considerable effect on the durability of the exhaust valves which are exposed to the currents of hot gases flowing over them, and which, so far, have not been artificially cooled. It may be thought, perhaps, that in the case of the *Suecia*, the lower temperature is in part due to more heat being abstracted through the cylinder walls. This, however, is seen not to be the case, from the consideration, first, that the *Suecia*'s cylinders are much larger than the others, consequently their cooling surface is considerably less in proportion to the volume of the gas they contain; and, secondly, from the fact that, combined with the large proportion of cooling surface in the small cylinders of the land engine, there was a very ample supply of circulating water, as is shown by the fact that this water abstracted over 20 per cent. of the total heat of combustion, this being more than half the quantity converted into work. The real cause of the comparatively low exhaust temperature is, as has been pointed out to the writer by the engine builders, the spraying of the fuel oil has been so improved that much earlier combustion has been secured.

It is recognised that the actual efficiency of a heat engine, that is, the proportion of the heat converted into work, increases by using a higher initial temperature, consequently the portion of an oil charge which becomes burnt in the early part of the stroke where the temperature is very high must yield up more work than an equal quantity of oil burning towards the end of the stroke, where the temperature is very much lower. Early combustion, therefore, is to be aimed at so long as it does not increase the pressure at any instant above the maximum pressure provided for in the design, and provided the temperature attained does not of itself cause troubles. Although excellent results were obtained in the *Suecia* there is still room for further improvement, as still earlier combustion would be possible without increasing the maximum pressure.

To be concluded.

THOMAS L. DEVITT.

President, Institute of Marine Engineers, 1913-1914.

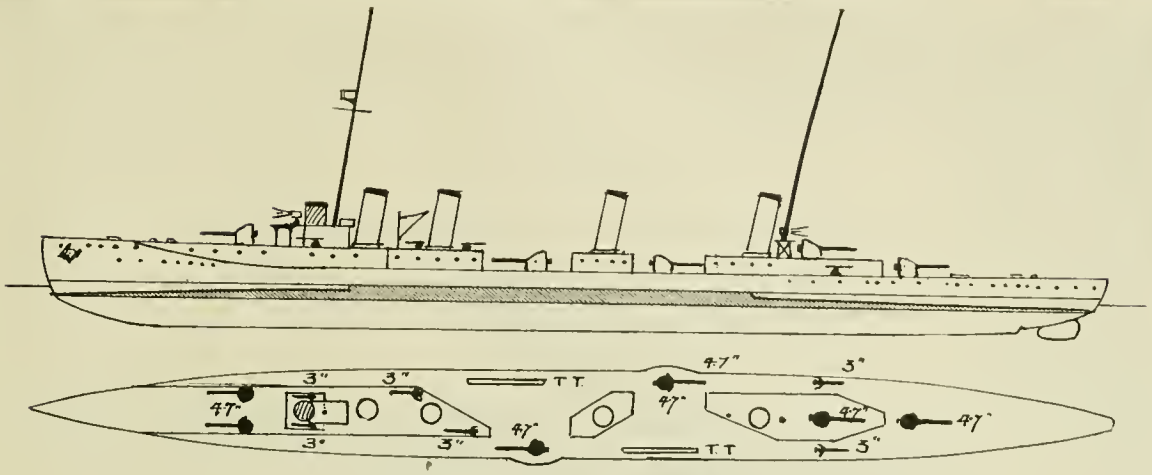
AT the Annual Meeting of the Institute of Marine Engineers, held on February 26th, Mr. T. L. Devitt presided and terminated his year of office. Owing to the great interest manifested by the President in connection with the new premises, he was instrumental in adding considerable *éclat* to the proceedings on the laying of the foundation stone. Mr. Devitt was born in London on March 28th, 1839, his father, Thos. H. Devitt, who founded, conjointly with Jos. Moore, the firm of Devitt & Moore in 1836, was born on March 25th, 1800. The son was, in 1860, admitted into partnership with this firm, so well known in the Australian trade. The business of the firm was greatly developed after the death of Mr. Duncan Dunbar, when part of the fleet in which he was largely interested came under the management of Devitt & Moore, and other vessels were added to the fleet. Further business dealt with was the loading brokerage management of Mr. T. B. Walker's Ships to Tasmania and those of Messrs. Richardson Bros. and Brown & Co. The building of the *Queen of the Thames* by Robert Napier & Son on the Clyde for Devitt & Moore in 1868, was a departure from the class of vessel associated with the name of the firm, in that she was a full-powered steamer, but she was wrecked off Cape Agulhas homeward bound and this somewhat deterred the building of other steamers which had been contemplated. A departure was then made by Mr. Devitt, when in 1878 he joined the firm of F. Green & Co., and became interested directly in the Orient Line. In addition to his activities in connection with the firms named, Mr. Devitt has been Chairman of Lloyd's Register of Shipping for five years, he is also President of the Equitable Life Assurance Society, President of the Shipping Federation, Chairman of the Royal Merchant Seamen's Orphanage and a Trustee of the Royal Alfred Aged Merchant Seamen's Institution; he has also been twice Master of the Skinners' Company. In 1890 he was President of the U.K. Chamber of Shipping, and in 1893 Chairman of the General Shipowners' Society, and for some years Chairman of the London Missionary Society. The scheme inaugurated in 1890 for the training of boys to become proficient seamen, serving in sailing ships, was due to the association of Mr. Devitt with Lord Brassey. It had been considered desirable that seamen should undergo training in sailing ships on the ground that the training thus acquired is much more useful and better in every respect than that acquired in a steamer. The training ships of Messrs. Devitt and Moore are the *Port Jackson* and *Medway*, and to their training in these and former vessels owned by the firm hundreds of officers now sailing owe their proficiency in their profession. Mr. Devitt is very much interested in art, and in 1908 presented a panel, entitled "Modern Commerce" (by Frank Brangwyn, A.R.A.) to the Royal Exchange. On retiring from the position of President, Mr. Devitt assured the Members of the Institute that his interest would still continue in its proceedings and he would be pleased to help in any good work where he could be of service.

ITALIAN SCOUT-CRUISERS "MARSALA" AND "QUARTO."

THE study of Italian warship designs is always interesting, inasmuch as they may be said to represent the direct antithesis of our own. For while we are content to provide moderate gun-power on a displacement which should assure good sea-going qualities, the Italians aim at the heaviest offensive qualities in combination with the highest speed and the lightest possible hull.

At times British ships fall short of the ideal aimed at. The "Town" class might be cited as a case in point. Their armament is good, they steam well, and the coal supply is sufficient, but they are bad sea-boats, rolling excessively and generally uncomfortable, besides making difficult gun-platforms in anything like heavy weather.

Hitherto the Italian constructors have produced almost uniformly successful ships. The "V. Emanuele" class, famous for their weight-saving girder construction, carry a couple of 12-in. and twelve 8-in. guns on a displacement of 12,625 tons, and are now steaming better than ever, easily maintaining 22 knots. Likewise the Dreadnoughts "Dante Alighieri" and "Cavour" classes have high speed, a heavy gun provision, and moderate protection, with good sea-going qualities. A set-back seems, however, to have been experienced with the new scouts of the *Marsala* and *Quarto* types, and from all accounts they are far from being good sea-boats. In them too much has been attempted upon the displacement; either this, or else the lines



Plan of the Italian Scout-Cruiser *Marsala*

are faulty—probably the former, as the trial speeds were attained in good weather.

The two ships differ considerably in design, the *Quarto* being the sole representative of her type, while two of the *Marsalas* are finished and a third either building or projected. In each the armament is the same, *viz.*—Six 4·7-in. and six 3-in. guns, with two torpedo tubes, but from the plans it will be seen that whereas in the former ship the guns are disposed to give arcs of fire on one side only, the latter has her amidships guns *en echelon* so that they can be brought to bear on either broadside. In addition, while the bow of the *Quarto* is slightly curved forwards ram shape, the *Marsala* has a convex stem, well cut away from the water line to the keel. The difference is accentuated in their profiles, the *Quarto* having three short bolt-upright funnels, and the others four narrow raked smoke-stacks, peculiarly spaced.

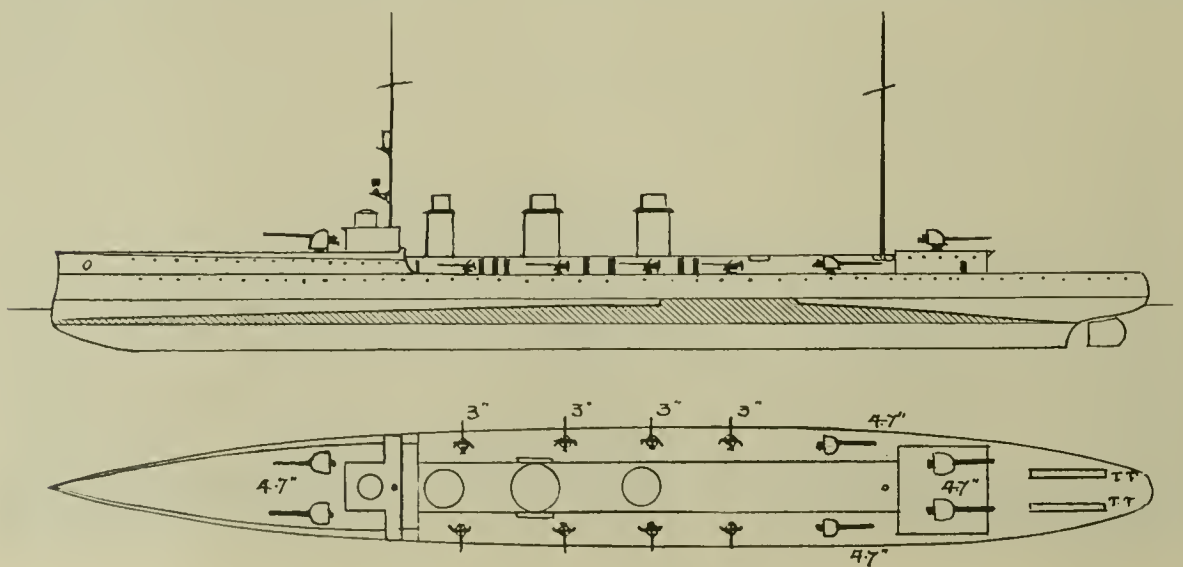
The *Quarto* was laid down at Venice on November, 1909, launched in August, 1911, and completed for sea last year. She displaces 3,300 tons, her dimensions being :—length (b.p.) 417 ft., beam 42¼ ft. and draught (mean) 13 ft. Her complement is 197 officers and men. The 4·7-in. guns are placed in pairs on the forecastle —which has a slight whale-back—amidships, athwart of the main mast, and on the superstructure over the poop. The fore and aftermost pairs have the same command, but the amidships guns are a deck lower. Three 3-in. guns are spaced amidships on either side, while the two torpedo tubes are mounted in the stern. These discharge the 18-in. weapon. Driven by Parsons turbines of 25,000

Italian Scout-Cruiser *Marsala*.

Italian Scout-Cruiser *Quarto*.

designed H.P. she easily reached 28 knots to trial (max. 29·5 knots), steam being generated in ten Blechynden boilers,—she being the third Italian ship to be so equipped. In the past Belleville, Babcock and Niclausse boilers have held the field, but both in the *D. Alighieri* and *San Giorgio* the Blechynden has given excellent results. On trial she used oil fuel only, of which 450 tons was the normal and 800 tons the maximum storage. The furnaces, however, were seemingly a source of never-ending trouble, and accordingly the liquid installation was removed and coal substituted, both in the *Quarto* and the other two ships. Details as to the fuel capacity now are wanting.

The *Marsala* and *Nino Bixio* are somewhat larger ships, being 431 ft. (b.p.) long, with a beam of 42½ ft. and a draught of 13¼ ft., the displacement rising to 3,470 tons. The guns are placed two forward, two amidships diagonally, the port being forward, and two aft, one on the raised deck and the other on the quarter deck. The positions of the 3-in. guns are best seen from the plan; their arrangement gives them wide arcs of fire with but little interference. The torpedo tubes are situated one on each side, amidships. Owing to her greater length and finer lines, the horse power is not so much as in the previous ship; Parsons turbines of 22,500 designed h.p. give a speed of 28 knots. She has fourteen boilers



Plan of the Italian Scout-Cruiser *Quarto*.

TABLE.

	Type.	Displ. Tons.	I.H.P.	Speed.	Armament.	T. Tubes.	Coal.	Launch.
ENGLAND ..	*Falmouth* ..	5,250	25,000	25	8 6"	2	750—1,000	1910
	Active	3,360	18,000	25	4 smaller 10 4"	2	450—600	1911
AUSTRIA ..	*A. Spaun* ..	3,500	20,000	26	7 3·9" 2 smaller	3	450—850	1909
BRAZIL ..	*Bahia*.. ..	3,000	18,000	26·5	10 4·7" 6 smaller	2	650	1908
GERMANY ..	*Augsburg* ..	4,281	19,600	25 5	12 4·1" 2 smaller	2	400—900	1909
ITALY ..	*Quarto*.. ..	3,300	25,000	28	6 4·7"	2	(?)	1911-12
	Marsala ..	3,470	22,500	28	6 smaller		(?)	
JAPAN ..	*Yahagi*.. ..	4,950	22,500	26	6 6" 4 3" 4 smaller	2	600—850	1911
U.S.A. ..	*Salem*	3,750	16,000	24	2 5" 8 3"	2	475—1,200	1907

(Blechynden) instead of ten, and the oil fuel supply was originally 400 to 1000 tons before the conversion to coal. Both ships were built at Castellamare and laid down in 1911; the *Bixio* was put afloat in December, 1911, and her sister in March, 1912, while both were completed last year. The protection of all the ships consists of a $1\frac{3}{4}$-in. steel deck, and the larger guns have thin shields.

Previous to the laying down of the *Quarto*, cruiser construction had been at a standstill in Italy—as in most other countries; no small ships had been built after the *Puglia* (1898), the fleet scouts having been the rebuilt torpedo-gunboats. The renaissance of the unarmoured cruiser having been practically universal, it is interesting to compare these Italian ships with their contemporaries in other countries.

It will be seen that they are smaller than their possible opponents, they have a higher speed, are as powerfully armed—or more so,—and possess a more general fuel supply. Their weak point is undoubtedly in their bad sea-going qualities, as with the exception of the British "Town" class the other types are reported to be good sea boats.

The menace of the new Austrian scouts will be met by the construction of a 5,000-ton type (*Carlo Mirabello*) armed with 6-in. guns, but full details of these are as yet lacking.

MARINE MOTOR NOTES.

THE trial added to by the subsequent service of the new Trinity House pilot cutter *Selsea* has been so satisfactory that an order for an 80-b.h.p. Beardmore engine has been given, to be fitted in the *Vigilant*, formerly a sailing cutter, now being altered and prepared for motor power. The *Selsea* ran trials in March on the Solent, when representatives of the Trinity House were on board, in order to test the capabilities of the vessel and the motor, supplied by Messrs. Beardmore. This firm has several orders in hand for motors from 60 to 250 b.h.p., including repeat sets for New Zealand, Java and China, comprising eleven engines in all. Several improvements have been made in the engines built at Dalmuir with a view to simplicity and direct reversal. The speed has also been reduced, so that the revolutions of the engines may be more in keeping with propeller efficiency. There are two sets of 250 b.h.p. ready for delivery in the works, embodying the recent improvements as noted last month. Messrs. Burmeister & Wain's Glasgow works are fully occupied and the engines for the Atlantic Transport vessel *Mississippi* are nearing completion. The demand for motor-driven barges is increasing and several orders are being placed for such barges to be used in connection with the transport of oils within coastal areas adjacent to the oilfields. The orders for oil motors attached to dynamos for electric light, both for emergency and ordinary service, have been increasing for large steamers, as these are found of advantage even for the ordinary working to meet the daily requirements of ventilation and light.

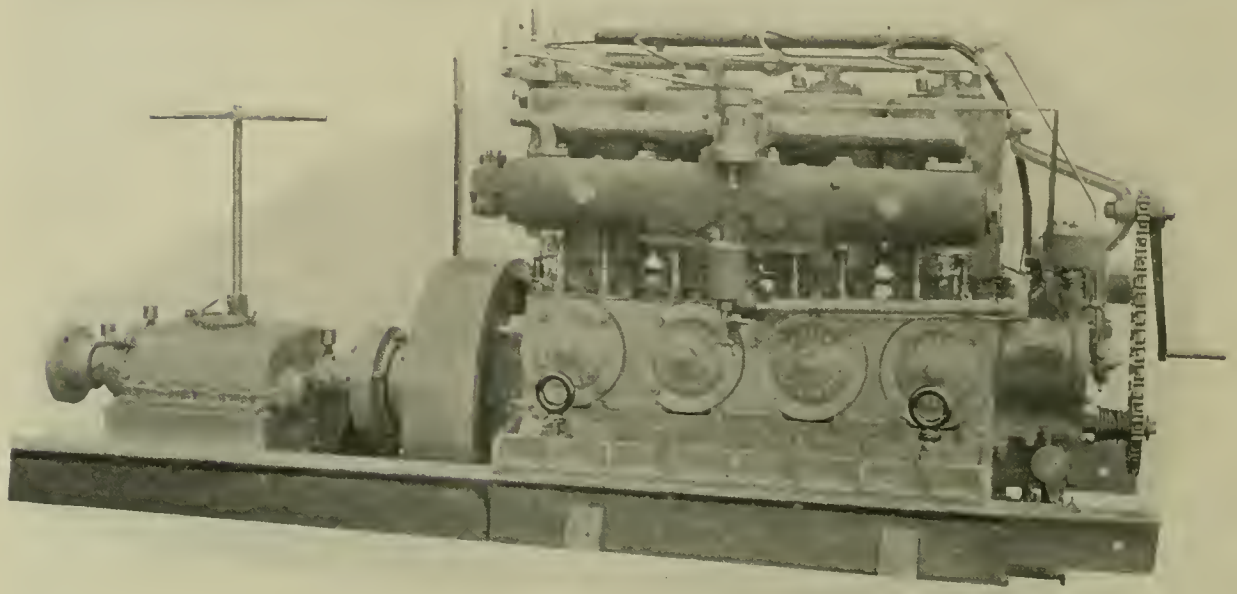
The building of motor boats continues to develop, not only on the Clyde, but in many of the outlying ports along the West and East Coast of Scotland. Still another vessel for the Coasting Motor Shipping Co., of Glasgow, has just been put into the water by Messrs. William Chalmers & Co., Rutherglen. This is the *Innisulva*, a single-screw motor coaster, 115 ft. in length, and designed to carry 400 tons deadweight on a draught of 10 ft. The engines are by Messrs. William Beardmore & Co., and are of their hot-bulb type, reversing by compressed air, with an auxiliary engine driving an air compressor for starting. The first motor boat built in Wigtownshire has just been produced by Messrs. Rodie, Logan Mill, near Ardwell. The boat, which has been built to the order of Mr. James Blackwell, Longrigg, is intended for the heavy fishing. She is 22 ft. in length, 8 ft. in breadth, and is fitted with a Caille motor by Messrs. Reid & Adams, Stranraer.

"TITANIC" ENGINEERS' SOUTHAMPTON MEMORIAL.—Photographic picture post-cards of the Memorial and unveiling ceremony may be obtained from the Publishers of this journal, 3, Amen Corner, London, E.C.

THE INSTITUTE OF METALS.—Professor E. Heyn, of Berlin, one of the most famous scientists in Germany, is this year to deliver the annual May Lecture before the Institute of Metals, May 12th. Professor Heyn, who has made a life-long study of the subject, has given the title of his discourse as "Internal strains in cold-wrought metals, and some troubles caused thereby."

THE Marine Department of the Board of Trade report that the number and nett tonnage of British vessels respecting whose loss reports were received at the Board of Trade during the month of March, 1914, and the number of lives lost, are as follows:—Thirty sailing vessels, tonnage 3,896, forty-four lives lost. ten steam vessels, tonnage 3,524, thirteen lives lost.

THE engineers of the Isle of Thanet are to be congratulated on the successful formation of the Society of Engineers of the Isle of Thanet; such associations are always conducive of good. The first meeting was held in Margate on April 7th, when Mr. A. E. Battle, M.I.Mar.E., M.R.S.I., ex-Chief Engineer, delivered the inaugural lecture, choosing for his subject the combustion of solid fuels. The lecture was illustrated by lantern slides, and a hearty vote of thanks was accorded to Mr. Battle at the end of the evening. We wish the association every success.



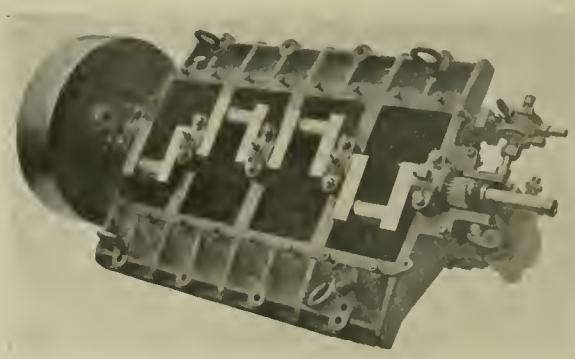
60 h.p. Parsons Machinery set for Paraffin Oil (1914).

PARSONS MARINE MOTORS.

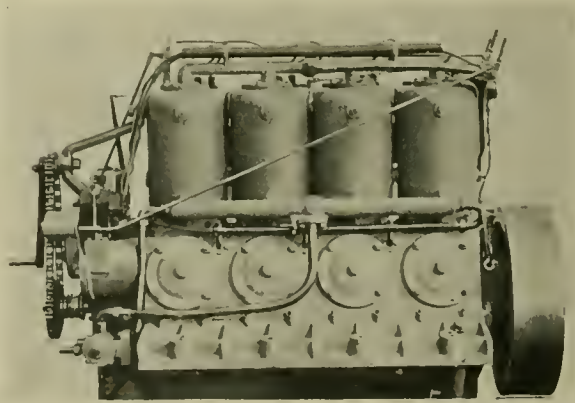
THE catalogue published by The Parsons Motor Co., Ltd., of Town Quay Works, Southampton, is excellent for illustration and descriptive matter in connection with the various installations carried out by the firm, both in respect to land and marine service, and those who are contemplating the fitting of motors for any purpose are invited to apply for copies in order that they may obtain particulars of what can be done to meet their requirements. We give a few illustrations from the many contained in the catalogue. These represent the latest type of a 60-h.p. engine and reverse gear. The crank shaft is carried in the lower half bedplate or crank chamber, and has separate capped bearings, which can be attended to through doorways in the chamber; the lubrication of the bearings is dealt with by a pump. Provision is made by means of detachable eye bolts for lifting the engine. In connection with the lubrication, a dipper rod is provided to indicate the depth of the oil, while a gauze strainer is fitted at the pump, readily removed for cleaning. The crank chamber top portion encloses all the working parts and has ample doorways sufficient to remove the details for overhaul, including pistons and connecting rods, without disturbing the cylinders. The cylinders are water-jacketed the full length and the water openings are made large enough to encase the lubricating pipes, thus keeping the oil cool in its passage. Separate valves are fitted for inlet and exhaust and there are two ignition systems, each with its own separate plug. The vaporizer casting has a water jacket connected to the circulation, so that the heat radiated from it is no more than that from the cylinders. There are two blow lamps for starting the engine on paraffin; after heating up, these are removed and the small doors shut. The construction of pistons, connecting rods, valves, starting gear controls, circulating pump and other details is in accordance with the best practice, as carried out by the firm and the whole engine shows that attention to details which is necessary for the marine motor of to-day. The oil consumption is low and the magneto is fitted with the patent timing drive, which advances and retards the whole engine, making easy starting and slow running without misfiring.

SHIPPING, ENGINEERING AND MACHINERY EXHIBITION.

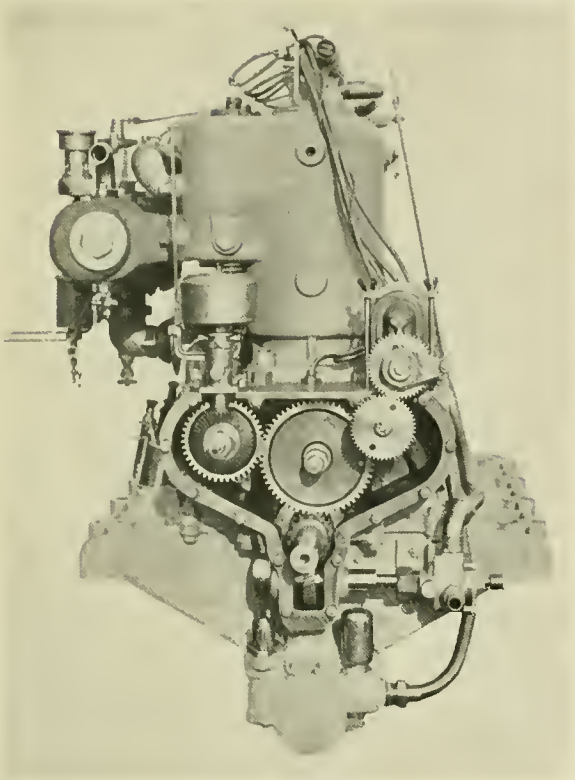
SPACE is still being booked by intending exhibitors for this Exhibition, recent bookings including Auto Recorder Co., Ltd., Leicester; Durvite, Ltd., London; R. Gay & Co., Ltd., London; John Haddon & Co., Ltd., London; Howkins Non-Corrosive Paint Co.; Ironite, Ltd., London; Miralite, Ltd., London; North British Rubber Co., Ltd., Edinburgh; North-Eastern Railway, Docks



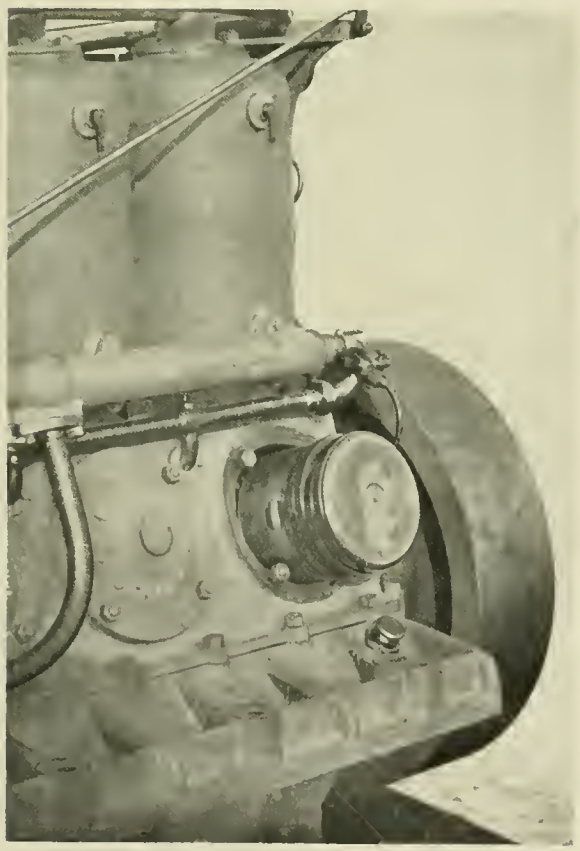
Engine Bed and Shaft.



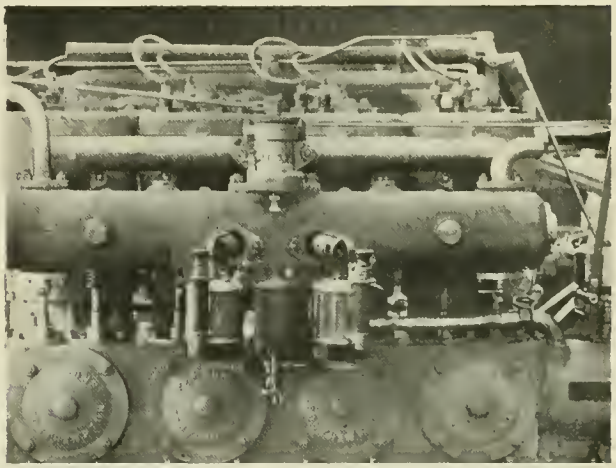
Forced Lubrication Arrangement.



Detail View of Gear.



Piston through Door (Parsons Motor).



Blow-lamp Starting Details.

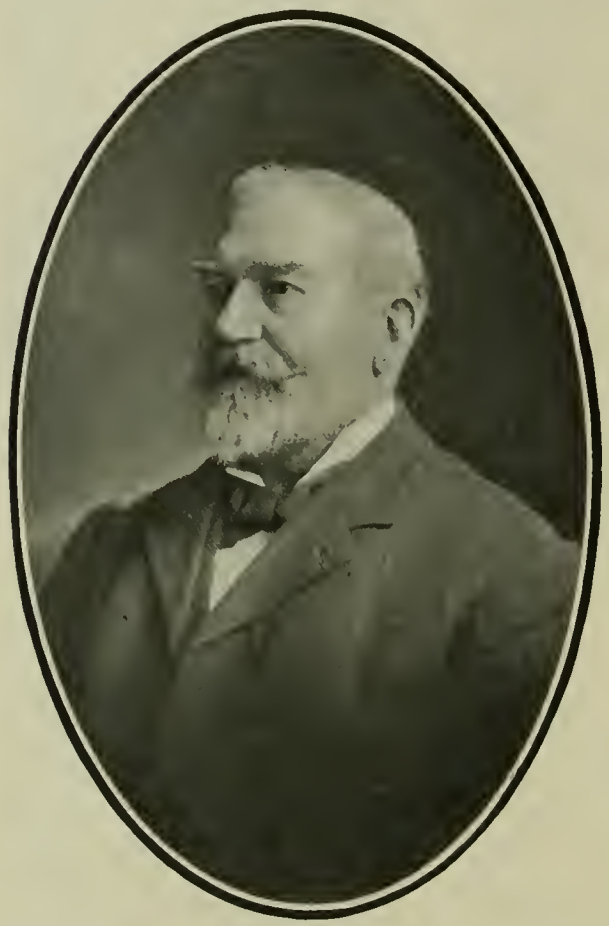
Department; Perkins & Co., Ltd., Leeds; Prices Co., Ltd., London; F. A. Pullen & Co., London; Siemens Bros. and Co., Ltd., London; Variable Speed Co., London; B. R. Vickers & Son, Ltd., Leeds; Yates Bros. & Co., Ltd., Darwen; Worsnop & Co., Ltd., Halifax. The importance of the Exhibition is becoming more fully recognised, as since the last great display of shipping and engineering appliances in connection with sea-borne traffic, many new features have been added and improvements made in several directions for the safety and comfort of ocean travellers, and for the more economic use of power generated for the propulsion of vessels, as also for the better utilization of power in saving labour. The list of intending exhibitors shows the developments which have taken place during the last ten years or so. A kinematograph theatre is being arranged for, so that exhibitors whose manufactures can be shown from the crude to the finished article on the screen may have an opportunity of illustrating their works and the various stages of progress. Lectures and papers will probably be given on alternate evenings during the time the Exhibition will be open. The correspondence on the subject of the drastic action taken by the Machine Tool and Engineering Association has been forwarded to us and confirms the view expressed in last issue, that the liberty of the members of the Association has been unduly interfered with. In cases where the firms who had booked space were manifestly specially interested in the manufacture of goods connected with the shipping industry, the Association might have courteously waived what appeared to be a rule or a tacit understanding that members shall not take part in exhibitions, save those organized by the Association. In the list of firms who have booked space, there are members of the Association, and it becomes a question with them whether they shall forfeit their liberty to exhibit or their membership. They may feel in honour bound to exhibit, having given their bond to do so, on the presumption that this Exhibition stands apart from the special trades exhibition usually organized by the Association, and this is the view generally held by the committee of the exhibitors, and it appears to be a sensible one. It is to be hoped that the whole subject will be carefully weighed and considered in the interests alike of the Association and its members.

Messrs. Holzapfels, Ltd., inform us that the tonnage of the vessels painted with their compositions during 1913, amounted to 18,179,030 tons.

Messrs. Escare & Denelle, Ltd., of 129, Wardour Street, W., ask us to announce that they have recently been honoured with the Royal Warrant of appointment as manufacturers of electrical fittings and bronzes to His Majesty King George V.

Messrs. T. W. Broadbent, Ltd., announce that they have made arrangements with Messrs. James C. Fisher and Co., of 62, Robertson Street, Glasgow, to represent them for the sale of generators, motors, etc., in Scotland (Mr. John D. Mackenzie, formerly the Scottish agent, has now ceased to represent Messrs. Broadbent).

OBITUARY.



John Lyall.

WE have to record with much regret the decease of Mr. John Lyall, M.I.N.A., who for about the past thirty-four years has been marine superintendent of the Clan Line of steamers trading between this country and the East. Deceased, who was at the time of his demise, seventy-two years of age, had been in the service of the Clan Line for thirty-seven years, and was probably the best-known, and one of the most highly respected marine superintendents connected with any ocean line of steamers having Glasgow and Liverpool as the port of registry. His demise will be regretted by a wide circle of friends in all parts of the world. Mr. Lyall was born at Blackhouse, Berwickshire, 10th June, 1842. He was educated at the school of his native village, and as he developed a liking for mathematics and engineering, he was at an early age apprenticed as an engineer to Messrs. Dickson & Munro, Dunbar. His apprenticeship completed he obtained employment with the Phœnix Engineering Co., Glasgow, and shortly thereafter secured employment in the works of Messrs. Tulloch & Denny, of Dumbarton, the founders of the now well-known marine engineering firm of Messrs. Denny & Co. As guarantee engineer for one of the steamers engined by that firm destined for South America, Mr. Lyall so conducted himself that shortly afterwards he was deputed to go with some of the fleet of the Irrawaddy Flotilla Co., so many of which were at that time and are still built by Messrs. Wm. Denny Bros., the associated Dumbarton firm with Messrs. Tulloch & Denny. As engineer on the steamers of the Irrawaddy Flotilla Co., he was engaged for almost thirteen years, and returned home in 1873. In the same year he was appointed by Messrs. Caird & Co., Greenock, to take out to Java the new steamer *Marapi* for the Nederlands India Steamship Co., and remained with the latter for four years in charge of several of their steamers. This Company offered him the post of superintending engineer, but he preferred to come home. In 1877 he joined the Clan Line and superintended the building of the first six steamers of that Company, and proceeding to sea as chief engineer in the *Clan Lamont*, the last of the vessels built at that time. He was, however, not long at sea before Sir Charles Cayzer (then Mr. Cayzer) appointed him as superintending engineer of the Company, and it was very much owing to the unremitting care and great ability of Mr. Lyall that the splendid reputation of this line for high-class steamers was established. During the period of his service with the Clan Line Mr. Lyall designed and superintended the building of between seventy and eighty steamers for the Company, and he was the originator of many improvements in the construction of vessels and their machinery, which are now in world-wide use. The deceased, in addition to being a thoroughly experienced sea-going engineer, had intrepidity and skill as an engineer in matters connected with shore undertakings, and in 1908, while in charge of the salvage operations on the *Clan Macdougall*, which went ashore near Gibraltar, he succeeded in refloating and in dry-docking her with her full cargo of about 6,000 tons on board, successfully patching her broken shell so that she was enabled to complete her voyage to London without disturbing the cargo. The deceased was a member of the Institution of Engineers and Shipbuilders in Scotland from 1885. In 1901 he was elected a member of the Institution of Naval Architects. He was an assessor to the Board of Trade and on several occasions gave expert evidence at enquiries of the British Admiralty. Mr. Lyall leaves a widow, four sons and one daughter, several of the sons following in his footsteps as respects engineering. One of them is Mr. Wm. Lyall, surveyor, on the staff of the British Corporation Registry of Shipping.

William Bailey.

We regret to announce the death of Mr. William Bailey, secretary of Messrs. Harland & Wolff, Ltd., which took place in London on the 8th April. The deceased, a native of Belfast, was the son of the late Mr. John Bailey, who had been associated with the firm since its inception and exerted considerable influence on the earlier stages of its prosperous record. Mr. Bailey entered on his business career in November, 1880, and followed in his father's footsteps—a case of an able man being succeeded by his still abler son—for, thanks to his father's wise training and his own ability, he became an even more important factor in the development of the great concern than his father had been in its earlier stages. His career was a record of uninterrupted progress and success. By his perseverance, aptitude, application and marked ability he gained the confidence of the late Sir Edward Harland and Mr. G. W. Wolff, and chiefly Lord Pirrie, the three outstanding names in the history of this eminent firm. His advancement was rapid. He occupied positions of growing responsibility and usefulness, being eventually appointed secretary of the Company. In this position he, to a large extent, held the threads of one of the largest and most progressive industrial and commercial organizations in the United Kingdom; and, moreover, as chief assistant to Lord Pirrie, the chairman, he rendered invaluable service in many ways, particularly in connection with the more recent developments of the Company, in the establishment of works at Glasgow, Liverpool and Southampton, besides assisting his Lordship in his various interests outside his own firm.

Mr. Bailey was devoted to the interests of Messrs. Harland and Wolff, Ltd., and proud of the pre-eminent position it has attained in the industrial and commercial world. His life is a record of work well done. He was one of those quiet, unassuming men of outstanding ability, who seek no public notoriety, but apply themselves to business, to the great advantage of the community. He knew everything in connection with the vast undertaking with which he was associated; few men have ever attained greater efficiency in any walk of life. His work bore the hall mark of thoroughness and perfection. He was, we are told, never at fault, and it would be difficult to over-estimate the value and importance of his lifelong service to Messrs. Harland & Wolff. As showing the extent of the business, we are informed that during the week Mr. Bailey passed away, the Belfast works alone employed

William Bailey.

between 15,000 and 16,000 men, and paid £30,000 in wages; while at their other works they employ over 10,000 men, or an aggregate of over 25,000 men, with a weekly wage bill approximating £50,000.

By principals and colleagues alike Mr. Bailey was held in the highest esteem, and by general consent he occupied a unique position. In all the varied business, incident to the co-related industries of shipbuilding, engineering and shipping, he was a recognised authority; he became the general adviser in all matters of importance and difficulty, and his untimely death at the early age of forty-eight is a great loss to the Company. He was a man of the utmost probity and rectitude; his word was his bond, and he will be held in affectionate remembrance by his colleagues as a man of kindly disposition and genial temperament. Mr. Bailey was also secretary of the Ocean Transport Co., Ltd., and a director of the Burmeister & Wain (Diesel system) Oil Engine Co., Ltd., a director of Messrs. Aldam Heaton & Co., Ltd , and of the Atlas Mercantile Co., Ltd. Although working almost to the last, the deceased gentleman had been in indifferent health for some time, suffering from an internal complaint, but his death had not been anticipated, and to his sorrowing wife and sisters the deepest sympathy will be extended in their bereavement.

THE Anglo-American Exhibition, to be held at the "White City," Shepherd's Bush, opens on May 14th. Many attractions are being provided for what promises to be an excellent exhibition.

THE quarterly meeting of the Marine Society was held on the 21st April, the Earl of Romney presiding. It was reported that during the quarter thirty-three boys had been received into the Navy and twenty-three drafted into the merchant service.

MR. ALEXANDER DUNBAR, who had been appointed chief engineer of the *Aquitania*, died suddenly on the 4th of April at South Glasgow. Mr. Dunbar had been in the service of the Cunard Company for over thirty years, and was formerly chief engineer of the *Lusitania*.

THE 15th April last was the second anniversary of the sinking of the *Titanic*, and it was the day chosen for the opening of the cloister erected at Godalming to the memory of John George Phillips, the chief wireless operator, who was a native of that town.

MESSRS. SIR W. H. BAILEY & CO., LTD., Albion Works, Salford, Manchester, have just received an order through their agents, Messrs. R. H. Longbotham & Co., Ltd., Wakefield, for one of their "Köster's" patent electrically-driven air compressors to deal with 1,600 cubic feet of free air per minute, for the Consett Iron Co., Ltd., Consett, Co. Durham.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Work in Progress.—Shipbuilding and marine engineering on the Clyde during April have been conducted with uniform, if moderate, progress, and nothing very outstanding has occurred either in the matter of launches or trial trips, but anything there is of that character to record will be found in the notes which follow. New contracts, unfortunately, either in the way of mercantile or naval shipbuilding are not in evidence in any decisive form; but, as will be seen, the prospects as regards naval work at least are somewhat cheery.

An exception to the general statement above made as to nothing outstanding having taken place in the matter of launches falls to be noted in connection with the launch from the Fairfield Shipbuilding and Engineering Company's Works, Govan, of the light armoured cruiser, *Undaunted*. This important event is arranged for April 28th, and the prospective safe consignment of the vessel to the water will add 3,500 tons to the output volume for April. The *Undaunted* is 410 ft. in length, of about 3,500 tons displacement, 30,000 i.h.p., and 29 knots speed, and is one of a group of eight similar ships ordered in 1912 and now under construction. Of these, two have been launched—the *Arethusa* at Chatham, and the *Aurora* at Devonport. Three—the *Galatea*, the *Inconstant* and the *Royalist*—are under construction at Dalmuir; and two—the *Penelope* and the *Phaeton*—at Barrow-in-Furness. The group are to form a new class, and they will be armed almost as heavily as the first "Town" class, with protection equal to the later vessels of the same class. For their size they will be the fastest, most powerfully armed, and best protected of any vessels yet designed. Another group of eight vessels of the same type have been placed—two at Pembroke, two at Chatham, one at Devonport, one at Birkenhead, and two on the Tyne.

Prospective Naval Work.—All the firms on the Clyde whose establishments are equipped for undertaking the heaviest of naval contract work, like others similarly equipped elsewhere, have been asked to tender for the hull and machinery of two battleships of the 1914-15 programme, and although in one, if not two cases, certain of the firms may be ruled out of school on account of either not having vacant berths or of having so largely shared in the similar contracts of the 1913-14 programme, strong hopes are entertained of success attending the efforts to secure one, if not both of the battleships to be given out. Vacant berths suitable for ships of the type are, or very soon will be, available in the shipyards of Messrs. John Brown & Co., Clydebank; Scotts' Co., Greenock; and the Fairfield Co., Govan; the latter of whom as above noted, are launching on April 28th the light-armoured cruiser *Undaunted*. Both of the vessels to be placed are of the "Royal Sovereign" class, and work will probably be begun on them in July. They will be 21-knot ships of 580 ft. length, and will be armed with eight 15-inch guns, and a large battery of 6-inch quick firers. The two remaining battleships of the 1914-15 programme are to be built in Royal Dockyards; a "Queen Elizabeth" at Portsmouth, and a "Royal Sovereign" at Devonport. Each of the four armoured ships of the programme is to be completed in twenty-seven months.

Messrs. John Brown & Co., Ltd., Clydebank, it is believed, have received a provisional order to build a submarine depot ship for the Australian Government. The Commonwealth Government have two submarines—the *AE* 1 and *AE* 2—each of 800 tons, and with a speed of 15 knots. These were launched by Messrs. Vickers, Ltd., of Barrow-in-Furness, in the summer of last year, and the *AE* 1 left Barrow in January for Australia. As yet the Commonwealth Government have only one capital ship—the Clydebank-built battle cruiser *Australia*—but they have two new second-class cruisers completed and one under construction at Sydney, three destroyers completed and three under construction in home yards, and also their two submarines.

New Powerful Dredgers.—The demand of mercantile shipowners for greater depth of water for their newest ships, and those in contemplation, is putting constant pressure on port

authorities in all parts of the world to maintain and increase depth of water in harbours and approaches, and this in turn is affecting the demand for enhanced dredging plant. The Bombay Port Trust, through their consulting engineer and agents—Sir J. Wolfe Barry & Partners, have recently placed with Messrs. William Simons & Co., Ltd., of Renfrew, an order for a very powerful bucket dredger, which is intended specially for further improving the port of Bombay and its approaches. The new dredger is to be capable of dredging to a depth of 50 ft., and will be generally on the lines of the *Corozal*, which the well-known Renfrew firm produced about two years ago for the Panama Canal and which has since done notable work there. For the Port of Colombo, Ceylon, a powerful twin-screw bucket-ladder hopper dredger has recently been launched from the yard of Messrs. Fleming and Ferguson, Ltd., Paisley. Designed by, and built under the superintendence of Messrs. Coode, Matthews, Fitzmaurice & Wilson, of London, on behalf of the Crown Agents for the Colonies, the new vessel—named *Sir William Matthews*—is one of the most powerful and finest equipped vessels of her kind afloat.

Messrs. Ferguson Brothers, shipbuilders and engineers, Port Glasgow, whose leading specialities are dredgers, hopper barges and steam tugs, have received an order to build and engine a steel twin-screw tug for South African owners. Another Port Glasgow shipbuilding firm has recently received the order to build a steel screw steamer for large dimensions for Colonial owners, the machinery for which will be supplied by an engineering firm in Glasgow.

Messrs. Yarrow & Co., of Scotstoun, were sincerely congratulated by many upon the successful refloating at the end of March of the torpedo boat destroyer *Laverock*, which ran ashore midway between Wemyss Bay and Largs a month previously while running her trials on the measured mile. Numerous efforts were made during the long period of her stranding to tow her off, but the water never rose sufficiently to allow the vessel to get clear of the shore. About 130 men were engaged in the salvage operations. The aperture of 45 ft. on the port side, extending from the break of the forecastle to the engine-room, was patched up with timber, while copious supplies of cement were used in covering the aperture from the inside, and success attended towing efforts at high spring tide on March 29th. The *Laverock* was towed by Clyde Shipping Co.'s tugs to Messrs. Inglis's Pointhouse yard, where repairs are being carried out. She is a destroyer of the "L" class, and is the third of the four vessels of the 1912-13 programme which Messrs. Yarrow, Scotstoun, have built for the Admiralty.

Ayrshire Coast Shipbuilding.—The Ailsa Shipbuilding Co., of Troon and Ayr, on April 11th launched two vessels; one a paddle steamer, the *Glen Usk*, from their Troon yard, and the other a steam yacht, the *Snipe*, from their yard at Ayr.

Record Ships Built on East Coast of Scotland.—Early in April successful speed trials were carried through with the screw steamer *Transvaal*, 7,450 tons deadweight, to which belongs the distinction of being the largest steamer yet built at Leith. She was built and engined by Messrs. Ramage and Ferguson. At the time of her launch, about two months ago, and more recently, it has been stated of her that she was the largest vessel yet launched on the East Coast of Scotland. A correction of this statement should be made in fairness to the shipbuilders of Dundee. The Caledon Shipbuilding and Engineering Co., Ltd., have built several steamers whose gross tonnage is considerably in excess of that of the *Transvaal*. In 1902 they built the s.s. *California*, 447½ ft. in length and and of 6,223 gross tons. In 1907-8 they produced the s.s. *Lanfranc* and s.s. *Hilary*, each 418 ft. long and of 6,300 tons gross. Last year they built the *Norwegian*, 400 ft. in length by 6,237 tons gross; all of these being larger than the *Transvaal* as measured by gross tons, although perhaps not on the basis of deadweight carrying capacity.

From the Grangemouth yard of the Greenock and Grangemouth Dockyard Co., there was launched on April 11th the oil-tank steamer *Ministro Ezcurra*, built to the order of the Argentine Government for conveying supplies of oil fuel to the vessels of the Argentine Navy. The Dockyard Co. designed and built the royal fleet auxiliary *Burma* for the British Admiralty for similar work. As the *Burma* was the first oil carrier specially designed and built for the British Navy, so the *Ministro Ezcurra* is the first for the Argentine Navy.

Messrs. Douglas & Grant, Ltd., engineers, Dunnikier Foundry, Kirkcaldy, have recently secured a highly important contract from the Admiralty in connection with Rosyth Dockyard. The contract embraces the supplying and fixing of fifty-five capstans, which are to be electrically operated. It is believed to be the largest single contract of the kind ever placed by the Admiralty, and while its cost will run into many thousands of pounds it will take two years to complete. Messrs. Douglas & Grant have provided machinery of the same class for Portsmouth, and have erected steam and electrically-driven pumping plant at Chatham and Pembroke dockyards.

Welding and Cutting of Metals.—This formed the subject of an interesting paper read at the last meeting of the Glasgow and West of Scotland Association of Foremen Engineers and Draughtsmen. The author of the paper, whose full title was "Oxy-acetylene plants and their application to the welding and cutting of metals," was Mr. C. Lindwood. He touched on the properties of oxygen and acetylene gases and the chemical changes which take place in the oxy-acetylene flame, with their effects on welds. Various types of acetylene generators were described, as well as the other items which constitute a plant. The difficulties experienced in welding the more common metals were gone into, along with the causes of these difficulties and the best methods to adopt to surmount them. A number of samples of oxy-acetylene cutting were shown, as well as samples of welding in steel, cast iron, copper and aluminium. Several types of blow-pipes, cutters, regulators and accessories were also shown.

THE TYNE.

(*From our Own Correspondent.*)

THE prominence of the Tyne in shipbuilding and its geographical position on the East Coast, as well as its close proximity to the coal and iron fields, undoubtedly makes it a desirable centre for a great firm looking around for opportunities of expansion. To these facts may probably be attributed the reported eagerness of Messrs. Harland & Wolff, the Belfast shipbuilders, to secure a yard on the Tyne. Rumour, however, went far in advance of fact when it stated in set terms that the great Belfast shipbuilders had completed negotiations to acquire the business of Messrs. Hawthorn, Leslie & Co., who are shipbuilders at Hebburn, and a big firm of engine builders at St. Peters, Newcastle. Experts believe that there is some prospect of the Belfast firm opening out on the Tyne and that the rumour is in the form of intelligent anticipation only; no one credited the news as it applied to the very successful business of Messrs. Hawthorn, Leslie & Co.

It is still a matter for gratification that trade is no less brisk nor the prospect any worse in spite of the agitation for the laying up of ships to secure better price in freights. This movement has in no way checked the influx of orders and shipowners do not appear to be unduly depressed at the sudden slump in freights, due in a large measure to the withholding of grain in Russia and the competition of the German coalfields with this country. There are not so many orders being booked, but at the same time there are no more men to be secured for employment in the shipyard. The demand for more hands is constant, but the supply does not increase. There is no unemployment at all in the shipbuilding trade on the Tyne. There are no labour troubles. The month has passed quietly in that respect and the only check has been the Easter holidays, which stopped work for the better part of a week.

There is more talk of fresh Government work for the Tyne. There is some confidence that Messrs. Armstrong, Whitworth and Co. will secure one of the new battleships in the financial programme of the year for their new yard below the bridge, where considerable progress has been made with the Malayan "Dreadnought" *Malaya*. Messrs. Swan, Hunter & Wigham Richardson, Ltd., at the adjoining yard at Wallsend have been asked to tender for one of the new contract battleships. This firm have not so far turned out a large armoured ship, but they built several destroyers and are at present engaged on a light cruiser. They are, of course, well known as the builders of famous Cunarders, including the *Mauretania*.

At the Elswick Yard the work on the two Chilian "Dreadnoughts" which Messrs. Armstrong, Whitworth & Co. are building, has made good progress and there are several commercial steamers being built, both here and at Walker, where considerable progress has been made with the completion of the new yard. It may be expected to be completed this year.

The Palmer Shipbuilding and Iron Company at Jarrow have the battleship *Resolution* in hand, and it may be expected to be launched at the end of this year or the beginning of 1915. They have several smaller boats building and have just booked an order for a passenger steamer to be built at the Hebburn yard. The vessel is to be 550 feet long.

Messrs. Jos. T. Eltringham & Co., at their new yard at Willington Quay, have booked an order for a cargo steamer of 250 feet for a Scotch firm of shipbuilders. Mr. Charles Rennoldson, of the Lawe Shipbuilding Yard, at South Shields, has received an order to build a small cargo steamer for Messrs. Joseph Monks, Liverpool.

In addition to their other work Messrs. Swan, Hunter and Wigham Richardson, of Wallsend, have secured the order for a large floating dock for the repairing yard which Messrs. Furness, Withy & Co., Ltd., are establishing at Schiedam, near Rotterdam. The dock is to be of the bolted sectional type which combines the advantages of the great longitudinal strength of the box type with greater facility for self-docking. The new dock is to have a lifting capacity of 10,000 tons. At this yard they have also secured an order for one of the big Russian oil tank steamers.

THE WEAR.

(*From our Own Correspondent.*)

STEADY work has been going on all the month and nothing has arisen to break the continuous tenor of business. The work is growing at this shipbuilding centre, as will be seen from the ouput in the first quarter of the year, which amounted to eighteen vessels with an aggregate tonnage of 73,464 being an increase of 3,812 on the corresponding period of 1913. The number of ships is the same, but the tonnage is much greater, bearing out what I said in my notes last month that the Wear is coming into competition with greater centres in the building of large cargo steamers, and has been specially successful in oil tankers.

Messrs. Geo. Clark, Ltd., of Southwick Engine Works, have a number of vessels which they are engining. The *La Habra* has been completed and sent to sea and they are now engaged on the s.s. *Pinewood*, which was launched from the yard of Messrs. S. P. Austin & Son last month, the s.s. *Dykland*, built by the Sunderland Shipbuilding Co., the *Edwin Hunter*, the *Sinsen*, the *Belridge* and the *Caloric*, the two latter vessels were built at Laing's Yard and the *Sinsen* by the Crown Shipbuilding Co.

Messrs. James Laing have secured an order for one of the three oil tankers placed in this country by the Russian Government.

Messrs. W. Doxford, who have made a speciality of the turret steamer, are now providing facilities for building Diesel oil engines. A considerable amount of money has been spent in equipping a shop for building internal combustion engines and they are at present building their second oil engine of the Junker type, which they expect to complete next month. They have increased the size of their joiner's shop to meet the demand for work on larger vessels and are now engaged on one bigger than anything they could have done before they made this change. The Diesel engine has come so greatly into favour that many firms on the North East coast have made arrangements or are preparing to meet the demand.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, have a large number of orders on hand and are reported to have secured the contract to build a medium-sized steamer, the machinery for which will be supplied by Messrs. Richardsons, Westgarth & Co., also of Middlesbrough.

Messrs. W. Harkess & Sons, Ltd.—Amongst the orders this Company have on hand are a 5,000-ton deadweight cargo and passenger steamer for the Ellerman Line; a 2,500-ton deadweight passenger steamer for Greek owners, also a small pilot steamer for the Trinity House Corporation, all on the stocks, and a 4,500-ton deadweight cargo and passenger steamer for the Ellerman Lines, Ltd., and a 900-ton deadweight coasting steamer for Sunderland owners.

Messrs. Smith's Dry Dock Co., South Bank, are busy repairing, docking and overhauling steamers. They have just secured the contract to build two steam trawlers. Great progress has been made with the extension at this yard.

Messrs. Richardsons, Westgarth & Co., Ltd., have enough marine and land boiler work in hand to last them for about twelve months. In their heavy stamping departments a great variety of work can now be made, upwards of £15,000 having been spent on plant, machinery, etc.

Stockton, Thornaby, etc.

Messrs. Richardson, Duck & Co. are reported to have secured the contract to build a medium-sized cargo steamer.

Messrs. Craig, Taylor & Co.—The steamer previously reported to be built to the order of Messrs. MacAndrew and Co., London, will be of the shelter-deck type, 275 ft. long and 2,700 tons deadweight, the machinery for which will be supplied by the North-Eastern Marine Engineering Co., Sunderland; also the 240-ft. Arch steamer building for Newcastle owners will be supplied with machinery by Messrs. Loveridge & Co., West Hartlepool.

Messrs. R. Ropner & Sons.—The order was previously reported of six river barges to be built for the Tees Conservancy Commissioners; each will be 100 ft. long and 350 tons deadweight.

Messrs. Blair & Co. are reported to have secured the contract to supply the machinery for a steamer building on the Tees, which, with the other work on hand, will keep them busy for at least twelve months.

West Hartlepool.

Messrs. R. Jobson & Co., Ltd., owners of the Maryport Shipbuilding and Repairing Co., Ltd., have delivered their first steamer, the s.s. *Athenas*, after a very successful trial. She is 121 ft. long, carries 320 tons deadweight on 10-1¼ ft. draught, and steamed 9 knots on 7 tons of coal. On going to press we are sorry to hear of the death of one of the senior partners.

The West Hartlepool Steam Navigation Co., Ltd. (Messrs. Guthie & Co.), have sold the s.s. *Haddon Hall*, of 2,608 gross tons, to Greek owners for about £12,500. The s.s. *Richmond*, reported sold by Messrs. Furness, Withy & Co., was bought by the West Russian Shipbuilding Co., Ltd., who have renamed her the s.s. *Dront*.

Messrs. R. Candlish & Sons, Ltd., have sold the s.s. *Oakwell*, 248 tons gross, to the United Glass Bottle Manufacturing Co., Ltd., London.

Sir Stephen Furness recently placed ten orders with Irvine's Shipbuilding and Dry Dock Co., Ltd., seven of 8,000 tons deadweight and three of 6,350 tons deadweight, totalling 75,050 tons for £507,000, equal to £6 15s. per ton. He has also placed an order for a cargo boat with Messrs. John Priestman & Co., Sunderland, and two additional 400-ft. boats with the Northumberland Shipbuilding Co., Howdon-on-Tyne, also an order for a "bolted sectional" floating dock to be built by Messrs. Swan, Hunter & Wigham Richardson, for the Furness Shipbuilding Co., Scheidam.

Messrs. W. Gray & Co., Ltd., are busy at both the old and new yards, they have just launched their second steamer with a cruiser stern.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard.—There is no new work to be reported, but the orders in hand will keep the Company busy throughout the year.

The Central Marine Engine Works of Messrs. W. Gray and Co., Ltd., have secured the contract to supply the engines and boilers for the cargo steamer contracted for last month. They have secured a large piece of ground from the North-Eastern Railway Co. for the extension of the works, to cope with the increased output anticipated with the opening of the Tees shipyard.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, will build six out of the ten boats ordered for the

British Empire Transport Co. The steamer *Grampian Range*, recently built by them, has been renamed the s.s. *Orange River*. The British Empire Transport Co. have also taken up two of the steamers building to the order of Messrs. Furness, Withy & Co.

Messrs. Richardsons, Westgarth & Co., Ltd., are reported to have secured two additional orders for Messrs. Furness, Withy & Co. The annual meeting was recently held, the balance sheet showing a marked improvement on previous years. With the amount of good work on hand it is anticipated locally that this old-established firm will retrieve itself.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Humber Site Wanted.—A number of enquiries are being made for sites on the banks of the river Humber for the establishment of new works; one of the companies seeking a site is that of Roters, Ltd., a firm of engineers who, we understand, have made an offer for a site on the Lincolnshire side of the Humber near to Ferriby Cliffs, Barton. Mr. F. Arlt, who is acting for the company, states that they have for some time been looking for a site for works for the construction of a new kind of turbine. The turbines now in use, he states, are constructed up to 1,500 h.p., but they intend constructing them from 10 h.p. not only for use on ships, but for motor cars, omnibuses, railway engines, and all kinds of motor lorries. The inventors are Messrs. R. Champ and F. W. H. Shepherd. Upwards of 500 workmen would be employed, so that if arrangements can be made with respect to the site it will be beneficial to the North Lincolnshire side of the river Humber.

Wool Cargo from Australia.—Another large cargo has arrived at Hull, the s.s. *Port Pire*, which came alongside the Hall and Barnsley Co.'s riverside quay, discharging 4,233 bales of wool in ten working hours, or an average of 423 bales per hour. This is a very creditable performance, and enabled the *Port Pire* to sail again the same evening. This is the first steamer of such a size to come alongside the river quay belonging to this Company. Electric cranes have been specially fitted in order to give the quickest possible despatch into either railway truck or lighter. The cranes have proved of considerable value in the saving of time. To date, the import of sheep's wool from Australia into Hull by direct steamer is 41,800 bales. This wool all goes to Bradford.

Novel Craft at Goole.—At Goole on the 13th April there was launched from the Goole Shipbuilding and Repairing Co. a novel craft, a steel-built pontoon barge, intended for Bombay, and built under the superintendence of Messrs. Sir John Wolfe Barry & Co. The vessel is 160 ft. long by 20 ft. by 14 ft., and she is to be fitted with a 60-ton crane by Messrs. Armstrong, Whitworth & Co., who will supply the engine power.

Immingham Dock.—An alarming and curious mishap took place in the King's Dock, Immingham, on the 15th April whilst the London steamer *Nautilus* was selecting a berth. She was struck below the water line by the propeller of another steamer, and so badly injured that she showed signs of sinking. She was at once put ashore at the timber pond; by noon the vessel was half full of water, and a large number of men are now engaged removing the cargo. Further investigation shows that the s.s. *Nautilus*, which had been moored to a buoy, fouled the Glen Liner *Glen Sprae*, and the propeller of the liner was also damaged.

Hull Docks.—There is a great amount of tonnage arriving from the East, also from the Plate ports, grain being the special cargoes. A good number of the London liners, notably the P. & O. steamers, are discharging cargoes, also wool and fruit from Australian ports. The fruit makes very good prices at the auction fruit market, buyers coming to Hull from inland towns. There is very little doing at present in coal shipments; owing to the miners being on strike, most of the coal hoists and cranes are standing idle. The dock sides and spaces are now being prepared for wood cargoes from the Baltic. Messrs. W. A. Massey & Sons, agents and brokers, have had a cable from Cronstadt advising them that this ice port is expected to be clear of ice, with the ice-breaker *Ermack's* assistance, in about eight days' time. Nearly all the passenger steamers of Hull are now about to take up their summer runs and are looking forward to doing a good trade in the tourist season.

Messrs. Amos & Smith Ltd., engineers and boilermakers, are full up with orders as regards engines and boilers well into next year. The machinery is working at full pitch night and day to compete with the great amount of work in hand. The outside staff is kept fully employed with repair work on the different docks, also fitting machinery into new trawlers. The branch shop and works at Alexandra Dock are also fully employed with graving-dock work, and engine and deck repairs on the different steamers. All departments of the Albert Dock works are fully employed.

North-East Coast Engineering Works (Hull), Ltd., have had a fair amount of work during the month on the following steamers:—s.s. *Tiara*, s.s. *Trader*, s.s. *Lucida*, also the Royal Mail steamers s.s. *Catalina* and *Potaro*. S.s. *Lucida* dry-docked, heavy repairs to rudder, taking out new arms, plates etc., also engine and deck repairs. S.s. *Trader* very extensive repairs on deck and engine-room, and new doubling plates. S.s. *Catalina* dry-docked and general repairs. S.s. *Potaro*, insulation repairs in holds, etc. S.s. *Tiara* usual deck and engine repairs.

Messrs. Stewart & Craig, engineers and ship repairers.—Repair work has been executed during the month on the following vessels:—s.s. *Gyda*, s.s. *Don Diego*, s.s. *Gallas*, also local traders. Prospects seem good for month of May.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, have been very busy during the month on the several docks, with graving-dock work and deck and engine repairs. The firm's own graving dock has had an exceedingly busy time. All departments at the engine works, Neptune Street, are fully employed.

Thomas Tate, engineer and boilermaker, Clarence Engine Works, has removed the old and fitted new engines in s.t. *Kimberley*, thrust shaft fitted, also extensive deck repairs. The s.s. *Tudor*, s.s. *Spurn Point*, and several other steamers have had the usual deck and engine repairs. A fair number of enquiries for repair work have come in.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers and ship repairers, are well booked up with orders for trawlers, engines and boilers well into next year. The shop machinery is running night and day.

Messrs. Earles' Shipbuilding and Engineering Co., Ltd., are very busy building new steamers for local and other owners. The firm's patent slips keep well employed with repair work, etc.

H. Scarr, shipbuilder, Hessle, is building steel lighters for local owners, also water boats for dock use and Humber Conservancy light buoys.

Messrs. Livingstone & Cooper, Ltd., shipbuilders, Hessle.—This new promising firm seem to be enjoying good trade. They are proceeding with the building of three drifters for Falmouth owners, and the work is rapidly advancing. They have also booked a trawler, 125 ft., for Hull owners, to exceed Lloyd's requirements, with good engine power. The future looks very promising for this yard. They have up-to-date machinery to push forward work and give early delivery.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are booked up with orders for trawlers, coasters and tugs well into 1915. The firm has several vessels now at Hull fitting out and receiving machinery and boilers, etc., preparing for trial trips.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

"Titanic" Engineers' Southampton Memorial.—The event of the month has been the unveiling, on the 22nd April, of the memorial erected in Andrew's Park. A full report of the ceremony will be found elsewhere in this number.

Messrs. John I. Thornycroft & Co., Ltd.—H.M. torpedo-boat destroyer *Unity* was handed over at the end of March and the destroyer *Victor* is at the time of writing running trials. The torpedo-boat destroyer *Lookout* was launched at the latter end of April. The Canadian customs cruiser *Margaret* has been handed over. Good progress has been

made on the twin-screw tugs for the Argentine Navy. Several motor boats have completed trials during the month, and some have been delivered and orders for a number of others have been received. A considerable amount of general engineering work has gone through the shops in addition to the machinery for vessels in hand. The repairs department has been very fully occupied upon vessels of various types.

J. Samuel White & Co., Ltd.—H.M. destroyers *Laurel* and *Liberty*, built to the 1912-13 programme, have been handed over to the Navy and are now in commission. The *Almirante Simpson*, the third of the six torpedo-boat destroyers building for the Chilian Government, is receiving machinery, and the fourth vessel, *Almirante Goni*, is being prepared for launching. The first of the two "Wight" seaplanes ordered by the Admiralty has made a successful preliminary flight. Sundry steam pinnaces, etc., have been delivered during the month.

Messrs. Day, Summers & Co., Ltd.—One or two repair jobs were cleared up before this firm closed for the Easter holidays. The dredger *Madjoe*, which was damaged in the heavy weather at the end of April, had a considerable amount of stiffening work put into her aft. The tugboat *Gauntlet*, damaged in collision off the Isle of Wight, had a new stem put into her and several shell plates, the vessel having been practically crumpled up as far as the collision bulkhead. The s.s. *Alert*, from Guernsey, had five shell plates removed and additional stiffening put in way of bunkers where shell had been damaged. All of these damage repairs were completed in time to allow the vessels to leave before Easter. The s.s. *Towy*, described in our last issue, has sailed for the West Indies. A sister vessel, the s.s. *Taff*, was launched on the 9th April. Repairs have been carried out on board the Isle of Wight Co.'s *Lorna Doone* and *Vulcan*. Several yachts are fitting out and a large number of yachts and Isle of Wight steamers have been booked for the slipway. New work is going on steadily, but delay has been caused in the shipyard through trouble with the riveters, which seems pretty general in the Port.

THAMES.

(*From our Own Correspondent.*)

New Steamers.—The P. & O. Co.'s new boat, the *Borda*, has reached the Thames; she is a twin-screw steamer and the last of five vessels built for the P. & O. branch line, and a duplicate of the *Berrima*. She is 520 ft. long by 62 ft. broad and has a depth of 41 ft., her measurement being about 11,000 tons gross. The accommodation is for 1,100 passengers and there are large numbers of cabins arranged on the tandem system.

For the British India Co. a vessel has been recently launched on the Tyne named the *Varela*. She is 390 ft. long by 53 ft. beam and intended for service between India and the Persian Gulf. The propelling machinery consists of two sets of triple-expansion engines.

For the Commonwealth and Dominion Line the new twin-screw steamer the *Star of England*, constructed by Messrs. Workman, Clark & Co., is due in London to take in cargo for her maiden voyage to Australia. She is 516 ft. long and has a gross tonnage of 9,150.

The Freight Question.—A conference of shipowners has taken place in London and a resolution been presented to the International Shipping Federation. The scheme put forward is briefly to subsidise vessels laid up and thus keep up the freights. The proposal is to compensate owners as follows: per gross ton per day—(a) vessels under five years old, 1d. plus 15 per cent.; (b) vessels five to ten years old, 1d. plus 5 per cent.; (c) vessels ten to twenty years old, 1d. less 10 per cent.; (d) vessels over twenty years old, 1d. less 33⅓ per cent. The matter was favourably received.

The Thames Engineering Works.—When the Thames Ironworks and Shipbuilding Co. was liquidated, the engineering works at Greenwich were purchased with a view of being re-opened and it is understood that the capital and orders are forthcoming to ensure twelve months' work when the re-opening takes place. Not only marine, but general work will be undertaken.

The Late Mr. Orbell.—This gentleman, so well known as the organizer of the Dockers' Union and a member of the Port of London Authority, has passed away at Bournemouth. A docker himself he was one of the founders of the Union and is responsible for the strength of that body to-day. Whenever disputes arose between masters and men he was invariably sent for by both sides. His labour in the 1912 dock strike is given as the cause of the death.

Trinity House.—An interesting celebration will shortly take place by this body, it being the Corporation's 400th anniversary of the charter granted by King Henry VIII. The functions of the body have changed somewhat during this long period, but the Corporation still remains the lighthouse authority for the country. The Brethren will celebrate the occasion on the 20th of this month by a grand banquet.

The "Northampton."—This vessel at her position on the embankment, is creating a good deal of attention. The demand for membership by London lads is very encouraging and the subscriptions that are necessary to put the vessel in proper trim internally are forthcoming. The aim is recreative and instructional. In the former are included swimming and gymnastics and in the latter carpentering and other trades, with lectures on farming and other matters connected with Colonial life. It was a good idea to give working lads this opportunity, which is certain of success now.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

Messrs. Cammell, Laird & Co.—General activity has prevailed during the past month upon the large number of contracts in hand in the various departments of this yard. The train ferry, *Major Leonard*, has its funnels erected, whilst the lifting deck for carrying the cars is in an advanced state, and when completed will form one of the most unique crafts turned out of this yard in recent years. The *Karmala*, for the P. & O. Company, is now receiving her machinery in the wet basin, whilst the fourth sister vessel, the *Kalyan*, is well on towards the launching stage. The various Admiralty contracts in hand are employing a large number of men. In the repair department there have been in hand the Anglo-American oil steamer *Cheyenne*, also the s.s. *Cherburg* and *Greta*. The Isle of Man S.S. Co.'s *Peel Castle* has been in for overhaul, as also the *St. Elvies* of the Liverpool and North Wales S.S. Co. The *Sutlej*, the *Valdivia* and the *Wapello* have also been docked. The annual general meeting of this Company was held at Sheffield on April 1st, when the report for the year ending December 31st was received. A profit of £174,126 was shown by the year's working, being an increase of £29,137 over the previous year. A final dividend of 5/- per share on the preference and 2/6 on the ordinary shares was declared.

Messrs. G. S. Goodwin & Co.—The *Santa Theresa* was launched by Messrs. Dunlop, Bremner & Co., at Port Glasgow on April 9th for the Santa Clara S.S. Co. Miss Nancy Royden performed the naming ceremony. Messrs. G. S. Goodwin, of Liverpool, consulting engineers and naval architects, have carried out the construction of both hull and machinery.

The Mersey Docks and Harbour Board.—Mr. Lionel A. P. Warner has been appointed joint assistant and general manager to date from May 2nd. Mr. Warner, who is thirty-eight years of age, has held the position of outside goods manager for the Northern Division of the London and North Western Railway Co.

The Liverpool and North Wales S.S. Co.—The new geared turbine steamer now building at the Clyde yard of Messrs. A. & S. Inglis is expected to be delivered in July. This vessel will be named the *St. Seiriol* and will run in conjunction with the *La Marguerite* and *St. Elvies* between Liverpool and North Wales. The dimensions are 240 ft. long and 31 ft. beam, the S.H.P. being about 2,000 and the sea speed 18 knots, carrying about 1,000 persons.

The St. Lawrence Route.—It is stated by Mr. Andrew Allan that it is decided that the *Alsatian* and *Calgarian* will make Quebec their port of call. Until a 35-ft. channel is made for Montreal, vessels drawing 30 ft. will have to stop at Quebec.

White Star Line.—On February 7th the *Majestic* reached Southampton from New York on her last voyage. Built by

Messrs. Harland & Wolff, she has been running for over twenty years, and was one of the earliest twin-screw boats. Messrs. Thos. Ward, of Sheffield, have purchased this graceful vessel for breaking up.

The Alexandra Towing Co.—This Company's tugs *Huskisson* and *Gladstone*, have recently been sold to the Russian Government and are about to leave for a Russian port after having alterations carried out. These tugs are of about 200 tons gross and about 100 ft. long.

The Dee Navigation.—The Board of Trade have recently received the report of Mr. G. W. Wilcocks, M.Inst.C.E., regarding the £75,000 scheme, for the improvement of the Dee Navigation. Mr. Wilcocks recommends that the scheme be adopted, and he considers that the navigation would be continuous between Mostyn Deep and Connahs Quay instead of intermittent.

Queenstown.—On April 8th, the Chairman, Town Clerk, and members of the Urban Council personally conveyed to Admiral Sir Chas. Coke, naval commander on the Irish Station, the Council's thanks for the interest taken in Queenstown. Admiral Sir Chas. Coke, who is retiring from the command after three years' residence, expressed his pleasure at the compliment bestowed on him by the townspeople.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—No striking incidents can be recorded as regards the shipbuilding and engineering trades of this place during the past month. The fact remains that shipbuilders are very busy on the heavy contracts in hand and are making vast progress with the several orders committed to their charge. There is, of course, a great scarcity of skilled men, and it is found impossible to correct this want so long as there is an insufficiency of houses to domicile any men who may want to come to the town. Messrs. Vickers, Ltd., are always doing something in the way of extending their works, and this continually means a further demand for houses. The work of building houses in the town is proceeding as quickly as builders can manage to get through the work, but the fact remains that they are not building new houses at sufficiently fast a rate to meet the needs of the people, and possibly now that the shipbuilding industry is likely to be less actively employed in the immediate future than it has been in the past, it may act as a deterrent to speculators and others who are engaged in this class of enterprise. The town is steadily growing from a population point of view, and much of this growth can be attributed to Messrs. Vickers.

No New Orders.—No new orders are reported for ships during the past month, but the firm have been busy in fixing up tenders for new work which will sooner or later result in the placing of new business. Tenders are being prepared for one of the two battleships required from private builders in the 1914-15 programme. It is known, of course, that the firm is already very busy with work for the Admiralty in almost every department of their works. One battleship is being finished in the docks at present, the *Emperor of India*, and another battleship is on the stocks, the *Revenge*. Very great progress is being made in the building of these ships, and every effort is being made to complete early deliveries. There is quite room for two other big ships like these to be laid down in the Vickers' yard, and the machinery in the establishment is quite adequate to the completing of these ships in the time required to meet the wishes of the Admiralty. There is, therefore, some hope that one of the new ships will come to the Vickers' firm, that is assuming the tenders are sufficiently low.

Work in Progress.—As many men as can be conveniently employed on the Turkish battleship *Reshadieh* and on the British battleship *Emperor of India* are working on double shifts on these modern and up-to-date ships. The *Reshadieh* is being speeded up in all departments, as the Turkish Government is anxious to get delivery of her at the earliest possible time. Everything that science and mechanical completeness can do is being employed to push this ship forward, and it is hoped by June she will be ready to go on her trials. The Turkish inspectors employed on the vessel have opened a club in Barrow, known as the Turkish Ottoman Club, in Dalton Road. These are the same premises as those lately occupied by the inspectors of the Japanese Government when the battle-cruiser *Kongo* was being built here. An equally strong posse of men are employed on the British battleship *Revenge*, which is lying alongside the Turkish battleship in the Buccleuch Dock, and great strides have been made in the engine and boiler departments in bringing the work as forward as possible. Electricians, plumbers and painters are also very busy at work and every week shows a further advance with the fitting up of this vessel. The *Emperor of India* is expected to be ready for her trials by the end of the year. The British battleship *Revenge* in the shipbuilding yard is beginning to grow into shape, and her great sides are lifting themselves up ready for the platers and riveters. The progress made in the building of the light cruisers *Phaeton* and *Penelope* has been very marked during the month, and it is expected one of the two will soon be ready to take the water. Attention is also being directed to the building of the oil-tank steamer *Olympia*, which will be an oil-driven vessel, the engines for which have been experimentally working very successfully for some time. The new section of the Brazilian floating dock is making great progress, and it is hoped to deliver this to Rio de Janeiro this year. In the submarine department, which is now a very big establishment, some sixteen vessels are in various stages of construction for the British Admiralty. One of the "E" class of these vessels went out on her trial trip during the month in the Irish Sea, with results which bear out the success of the previous members of this class which have been delivered. Much attention is being devoted to the new experimental submarine in course of construction, particulars of which are being kept a strict secret. It is understood, however, she will be much larger and much more powerful than any submarine yet designed or built.

Aviation Works.—The construction of a very huge shed at the works for the building of airships by Messrs. Vickers, Ltd., on Walney Island, about a mile from Messrs. Vickers' main works, gives one the idea of the great magnitude of this very big undertaking. Every effort is being made to get this department ready for work at the earliest possible date. Already the firm have orders in hand from the Government for the building of three Parsifal airships and one big Zeppelin airship, and the works are being fitted out to do a very great deal of work of this class later on.

Industrial Peace.—At the present time there is evidence of great industrial peace in the establishment of Messrs. Vickers. Certain troubles occur almost every week, but they have of late been only regarding minor matters which have been possible of adjustment on satisfactory lines. The settlement of the difficulty with the engineers has made it possible to make great headway with engineering work in both the engine shops and in the work of making gun mountings.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff have received an order for a steamer of between 8,000 and 9,000 tons gross for Messrs. Bibby Bros., Liverpool, whose entire fleet of seven fine twin-screw vessels was built at the Queen's Island. The new steamer is to be delivered in the autumn of 1915. The report that Messrs. Harland & Wolff had practically completed the negotiations for the purchase of Messrs. Hawthorn, Leslie and Co.'s yard at Hebburn-on-Tyne has received official denial. The only foundation for the rumour appears to be the fact that for some little time past there has been a working arrangement between Messrs. Harland & Wolff and the well-known Tyne firm, by which the former were, when necessary, to sublet the building of hulls to Messrs. Hawthorn, Leslie & Co. Another Lamport & Holt liner has just arrived in Belfast—the *Vasari*—where she will remain for some time in the hands of Messrs. Harland & Wolff, for extensive overhaul and alterations, including the fitting of refrigerating machinery. The *Voltaire*, belonging to the same owners, and upon which similar work is being carried out, is still in Messrs. Harland & Wolff's hands. She was dry-docked a short time since, and will shortly be ready for sea again.

Messrs. Workman, Clark & Co. have completed the fitting-out of the fine new Red Star liner *Star of England*, and have

launched the second of the new Ellerman liners which they have on order. The latest addition to this fleet is the *City of Exeter*, whose propelling machinery consists of two sets of quadruple-expansion engines balanced on the Yarrow-Schlick-Tweedy system. A third steamer for the same owners will be launched in the course of a week or so from time of writing. Shortly before the Easter holidays Messrs Workman, Clark & Co.'s boilermakers went out on strike over the apprentice question, but the strike was of short duration, an amicable settlement being promptly arrived at. Another Lamport & Holt vessel will shortly arrive in Belfast, when she will be taken in hand by Messrs. Workman, Clark & Co. She will undergo similar alterations to those on the *Voltaire* and *Vasari*, mentioned in the first paragraph of these notes.

Londonderry.—The shipbuilding industry on the Foyle is making rapid strides, and the North of Ireland Shipbuilding Co. is said to employ at present close on a thousand hands. The big vessel launched for the Isthmian Steamship Co. is fitting out. The steamers at present on the stocks include one for the Keystone Transportation Co., one for Messrs. Furness, Withy & Co., and a fruiter nearly 400 ft. in length. That the Port and Harbour Commissioners are fully alive to the necessity of fostering the trade, may be gathered from the fact that they have at present under consideration the question of building a floating dry dock for the port. The engineer has been instructed to make soundings for a suitable place in which to manipulate the dock, and the Commissioners are strongly in favour of the local firm having the contract for the construction of the dock.

THE BRISTOL CHANNEL.

(From our Own Correspondent.)

Cardiff, Barry and Newport.

THROUGHOUT the past month the volume of work in the various establishments of the Bristol Channel ports dealing with ship-repairing has been extremely moderate, partly owing, no doubt, to the close proximity of the holiday season, when a rather quiet time is generally anticipated. A further cause is the comparative inactivity in the coal trade, due to sluggish chartering, which causes the arrivals of tonnage to be below the average. Some of the larger establishments, however, have enjoyed a more or less constant volume of work, and are exceptionally fortunate to have done so in view of the moderate amount of repair work offering.

Mountstuart Dry Docks, Ltd.—There has been no cessation in the constant stream of work passing through the hands of this Company, the docks being kept full without a break. The steamer *Oldfield Grange* occupied one of the docks for a month with very heavy repairs due to straining. Two other very heavy jobs, *viz.*, the steamers *Aldersgate* and *Gogovale*, were also in hand during the month, the former having very heavy bottom damage due to stranding, and the latter having extensive side damage through collision.

Channel Dry Docks and Pontoon Co.—This Company, with its branch establishments at Cardiff, Barry, Newport and Sharpness, naturally dealt with a fair share of the available work in the nature of general repairs. The steamers under repair included the *Harlech, Dacre Hill, Harpalion, Otta, Antiope, Constance, Verdala, Blackheath, Familiaris, Gemma, Waverley, Rokos*, etc.

Messrs. Elliot & Jeffrey were among the lucky firms to be well engaged during the month. The work executed by this firm included the repair of bow damage to the steamer *Auldgirth*, damage and survey to the steamer *Eveline*, also general repairs on the steamers *Lena, Glenalmond, Okehampton, Poldhu, Polvarth, Nereus, Monotoria, Porthcawl, Pelham*, etc.

Junction Dry Dock, John Shearman & Co. and Hill's Dry Docks were very moderately engaged on general repair work, none of the work executed being of much importance.

At Barry the same condition of trade is reported as at Cardiff.

Graving Dock Co. were fairly well engaged on general repairs to the steamers *Cento, Fernmoor, Birchfield, Karmo, Wellington, Ilderton*, etc.

Messrs. C. H. Bailey had the steamers *Mary Park, Commonwealth, Teakwood*, etc., for general repairs, and also the steamer *Munin* for heavy damage repairs, the latter work being likely to last some weeks.

Some small sectional labour disputes threatened to disturb the industrial peace of this district during the month, but were happily smoothed over, leaving the horizon clear.

An agitation has been on foot in this district for some time past against the employment of Chinese seamen and firemen on British ships and matters are gradually assuming a serious aspect. The origin of the trouble is the increasing number of crews of Chinamen signed on in steamers of the tramp class trading regularly to Bristol Channel ports.

The new twin-screw steamer *Star of England*, owned by Messrs. James P. Corry & Co., of Belfast and London, was at Barry Dock during the month for the purpose of taking in bunkers preparatory to taking her place on her station between London, Australia and New Zealand. This steamer will be one of the units of the recently formed Commonwealth and Dominion Line of London, comprising the fleets of Messrs. Tyser, Messrs. Corry, Messrs. Milburn, and part of Messrs. Royden's fleet. The new ship is one of the finest examples of naval architecture turned out by the eminent firm of Messrs. Workman & Clark, of Belfast, and presents a pleasing appearance of combined symmetry and power. The fittings and appliances are of the finest class obtainable and it may also be mentioned that in addition to an extensive refrigerating plant on the CO_2 system, wireless telegraphy, submarine signalling apparatus and automatic fire indicators have been installed.

FOREIGN NOTES.

Austria.

THIS year, in Austrian yards, the following vessels have been launched,—from the Cantiere, S. Rocco, T.S.S. *Hungaria*, 400 ft. by 50 ft. by 28 ft. 6 in., for the Austrian Lloyd, a passenger and cargo steamer for voyages between Trieste and Shanghai. Three similar ships are in construction in the same yard. The estimated speed is 14 knots. The T.S.S. *Grado*, coasting passenger ship, for Istria Trieste Steamship Society, about 135 ft. by 20 ft. by 9 ft. 6 in., for shallow water, and fitted with two four-cylinder Diesel motors of 400 i.h.p. A speed of 12 knots is expected when loaded. The Cantiere of Monfalcone launched the S.S. *Erny*, a cargo boat for the Austro Americana, 405 ft. by 54 ft. by 37 ft. and 11,500 tons deadweight. A triple-expansion engine of British make is installed. On trials the vessel made 13·5 knots with half load.

The Government has granted the Adria Steamship Company a subsidy to the amount of £185,000 for one year, for which the Company undertake to carry certain mails.

Canada.

The largest freight steamer—*W. Grant Marden*—built for service on the Canadian lakes, was launched on April 4th, from the yard of the Port Arthur Shipbuilding and Dry Dock Co. The vessel was launched broadside on to the water and was witnessed by a very large crowd of spectators. The naming ceremony was performed by Lady William Taylor. The *W. Grant Marden* is a vessel constructed on the Isherwood system, 625 ft. by 59 ft. by 32 ft., with five bulkheads dividing off the cargo spaces. The trade on which she will be engaged is the carriage of cereals and her carrying capacity is equal to about 585,000 bushels of grain. The engines are triple-expansion of 2,000 h.p.; these were fitted on board previous to launching. The boilers are of the ordinary marine type. Electric light and wireless are being fitted. The opening of the season, when the ice-bound waters are free, early in May, is expected to witness the departure of this vessel on her first voyage.

China.

The Admiralty has acquired a small cruiser, *Fei Hung*, which has been built at the N.Y. Shipbuilding Co., Camden. It is chiefly destined for use as a training ship. Its length is 325 ft., beam 36½ ft., and its draught 13½ ft.

Denmark.

The motor vessel, *Kronprinz Gustav Adolf*, built at the shipyard of Burmeister & Wain, at Copenhagen, has been successfully put through her trial runs, when she attained a speed of 11 knots on a consumption of 0·180 kilo per horse power hour, thus exceeding the contract speed of 10 knots. Length 357 ft., beam 51 ft., and 6,500 tons carrying capacity.

France.

Launches have lately taken place at the following shipyards :—

Forges et Chantiers de la Méditerranée at Graville. Hopper barge, with steam power, for the port of Boulogne. Length 157 ft., beam 30 ft., 1,200 tons carrying capacity, speed eight knots. Two similar steam barges will be launched in a few weeks for the same port. Chantiers de la Seine.—A dredger for the Admiralty of 260 tons displacement and of 600 h.p.; three further dredgers to the same order will be shortly launched; two of the dredgers are for the port of Toulon and two for that of Bicerta. Chantiers Normand.—A motor boat built of steel, named *Argus*, for the Pilot Service of the Suez Canal. Length 91 ft., beam 27 ft. She will be equipped with two oil motors, System Renault. The twin mail steamer *Puerto-Rico*, built at the Chantiers de Normandie, to the order of the Transatlantic Co., has now been delivered and will be employed in the Havre-Haiti service. Length 430 ft., beam 51 ft., and 8,600 tons carrying capacity. She is equipped with reciprocating engines of 4,500 i.h.p., and will have a speed of 15 knots. The *Puerto-Rico* is fitted with all modern requirements for voyages in the Tropics, and with a powerful wireless plant. The Ateliers and Chantiers de la Gironde.—A floating dock for the port of Oran, which is to be used not only for lifting vessels up to about 1,200 tons, but for the refloating of submarines. For the latter purpose its bottom consists of two parts, which are joined to each other by two cross floats of 32 ft. length. By this means an opening of 30 ft. wide and 200 ft. long is provided, into which the raised submarine can be taken. The main dimensions are: Length over all 330 ft., length of dock above pontoon 270 ft., beam outside 82 ft., inside 41 ft., displacement, light, 2,000 tons. The Ateliers and Chantiers de la Loire.—The mail steamer *Sphinx*, built to the order of the Messageries Maritimes Co. Her length is 455 ft., beam 61 ft., displacement 13,800 tons, and she will be equipped with an engine of 10,000 i.h.p., to give her a speed of 17 knots. The *Sphinx* is to be employed on the service to Egypt. Les Chantiers et Ateliers de Provence.—The *Louis Fraissinet*, general cargo steamer, length 370 ft., beam 51 ft., 4,800 tons carrying capacity. She is intended for the Black Sea trade. Her triple-expansion engine and two steam boilers will develop 2,400 i.h.p., imparting a speed of 11 knots to the vessel. The Pilot Service of the Port of Calais is about to place an order for a small steam boat to be employed for the pilotage of the port and to be of the following dimensions: Total length 56 ft., greatest beam 15½ ft., and of 60 gross tons. It is to be constructed of steel to the highest class of Bureau Veritas, and to be equipped with a two-cylinder compound engine, with one boiler to give her a speed of 9 knots. She will have separate cabins specially fitted up to meet the requirements of the pilots and the crew.

Germany.

The following launches have taken place :—

Amasis, cargo steamer, built at the Flensburg shipyard to the order of the Kosmos Line at Hamburg. Length 480 ft., beam 59 ft., carrying capacity 12,000 tons, engines 3,800 i.h.p. *Cap Polonio*, triple-screw steamer, built at the Blohm & Voss shipyard to the order of the Hamburg South American Line. Length 650 ft., beam 72 ft., displacement 26,000 tons. Speed 18 knots. The engines will develop 17,500 i.h.p. The first section of a Floating Dock built at the Blohm & Voss shipyard, to the order of the Austrian Admiralty, has been launched. *Freiberg*, cargo steamer, built at the Tecklenborg shipyard for the German Australian Steamship Co. at Hamburg. Length 456 ft., beam 55 ft., carrying capacity 9,000 tons. Triple-expansion engines 4,000 i.h.p. Speed 13 knots. *Santa Ines*, cargo steamer, at the Bremen Vulcan shipyard, at Vegesack, to the order of the Hamburg South American Line. Length 420 ft, beam 52 ft., and carrying capacity 9,000 tons. Triple-expansion engine of 2,500 i.h.p., three boilers, speed 10½ knots. *Westmark*, built at the Weser shipyard for the Hamburg America Line. Length 415 ft., beam 55 ft., and 9,000 tons carrying capacity. In addition several launches have taken place of small steamers for local purposes at various shipyards.

The following steamers have undergone their trial runs :—

Anhalt, cargo steamer, built at the Bremen Vulcan at Vegesack, to the order of the North German Lloyd. Length 480 ft., beam 55 ft., 11,000 tons carrying capacity. Fitted with refrigerating plant, electric light, wireless plant, submarine signalling apparatus, triple-expansion engine of 4,500 i.h.p., four boilers with Howden's forced draught, speed 12½ knots. The vessel will be employed on the Australian service. *Grain Elevator*, built by the Unterweser shipyard for the North German Lloyd at Bremen for moving large quantities of grain, fitted with all modern machinery for this purpose. *Jupiter*, tank steamer, built at the Howaldt shipyard at Kiel, to the order of the German American Petroleum Co., at Hamburg. Length 525 ft., beam 67 ft., 17,280 tons carrying capacity; oil cargo can be discharged in seventeen hours. A quadruple-expansion engine of 3,500 i.h.p., is fitted, speed 10¾ knots. *Persia*, cargo steamer, built at the shipyard of the Flensburg Shipbuilding Co., to the order of the Hamburg America Line. Length 380 ft., beam 49 ft., of 6,500 tons carrying capacity on 22 ft. draught. Triple-expansion engine of 2,200 i.h.p.

The following orders have been secured by German shipyards :—

Blohm & Voss, Hamburg.—A large twin-screw passenger steamer, to have a speed of 20 knots, for the passenger service Italy-Alexandria. Lübeck Engineering and Shipyard Co. at Lübeck.—Two tug-boats for the New Steamship Company at Stettin. Nobiskrug Shipyard, Ltd.—A steel lighter for Cameroon, two motor lighters for Greece, a dredger barge for Finland.

Greece.

The National Chamber has agreed to the new programme for the extension of the Fleet. Two large battleships, in addition to the *Solamis*, are included, and three small cruisers and several vessels of smaller size. No information is obtainable as to the orders which have been already placed, although a rumour is current that the order for one battleship has gone to a French yard.

Holland.

Smit & Son, at Hoogezand, have constructed two elevator barges for the town of Bremen. The shipyard has now received a fresh order for the construction of six similar barges. The Gusto shipyard at Schiedam has secured an order for the construction of an 80-ton floating crane from the Dock Committee of Hull. The stipulated price is said to be 40 per cent. lower than the lowest English quotation.

Japan.

The battleship *Fuso*, which is being built at Kure Dockyard in a dry dock is to be floated very shortly. The engine and guns have already been taken on board. The *Fuso* is also being equipped with four 3-inch quick-firing guns as a defence against air ships. The keels of two further large vessels are to be laid down very shortly, so that the completion of the programme of the fleet will be considerably forwarded thereby. This includes the construction of eight battleships of 30,000 tons, four armoured cruisers of 27,500 tons, eight small cruisers of 6,000 tons, two scouts, twenty-six torpedo boats and ten submarines, all of which are to be completed by 1921.

Russia.

The plans of the Government are to construct the following ships for the extension of the fleet :—24 battleships, 12 large and 24 small cruisers, 108 torpedo boats and 36 submarines. These are to be completed by the year 1930. It is reported that an English limited company has been formed with a share capital of £5,000,000, which has acquired a large tract of land near Nikolaiev on the Black Sea for the purpose of establishing there a large shipyard, in which 15,000 to 20,000 men are to be employed.

Spain.

The plans for the extension of the fleet include the following new constructions :—Three battleships, two cruisers, six

destroyers, eight submarines. It is further intended to construct a Dry Dock for vessels up to 30,000 tons.

U.S.A.

The Newport News Shipbuilding and Dry Dock Company has received an order for a cargo steamer from the Crowell and Thurlow Steamship Co., at Boston, to be completed by the 1st December of this year. The length of this steamer is 375 ft. and it is to be equipped with powerful triple-expansion engines to obtain a high speed. The Admiralty is having plans prepared for the construction of the new battleship *No.* 40, the main dimensions of which are as follows: 742 ft. length, 99 ft. beam, 27½ ft. draught; the artillery of this ship will consist of twelve 14-inch guns, and the armour belt is to be of 17-inch thickness, that of the turrets 16 inches. Some further plans are also in preparation, details of which have not yet become known. The battleship *Texas*, of 28,000 tons, which has been constructed at the Newport News shipyard and is now completed has been put in commission. Its artillery consists of ten 14-inch guns and twenty-one 4½-inch guns. It is equipped with powerful engines giving the *Texas* a speed of 21 knots. The submarines *K*5 and *K*6 have now been successfully launched by the Electric Boat Company at the Fore River shipyard. These constructions have a displacement of 519 tons. A new dry dock, at Hunters Point, large enough to take in even the largest existing vessels, is to be at once commenced by the Union Iron Works at San Francisco. The *Oklahoma* battleship has been successfully launched at the Camden shipyard, N.J., of the N.Y. Shipbuilding Co. Her length is 583 ft. and her displacement 27,500 tons. Her artillery will chiefly consist of ten 14-inch guns. The *Oklahoma* will burn oil as its fuel.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Armstrong, Whitworth & Co., Ltd., Elswick.

SAN ISIDORO. Trial Trip. This steel screw petroleum steamer, built for the Eagle Oil Transport Company, Ltd., of London, has run her trial trip. In spite of the conditions of weather and sea, which were very unfavourable, a mean speed of 12 knots was attained. For Launch, see January issue.

S. P. Austin & Son, Ltd., Sunderland.

PINEWOOD. Launch, March 26th. Steel steam collier, about 3,250 tons deadweight capacity, for Messrs. Wm. France, Fenwick & Co., Limited, of London and Sunderland. The vessel is to be classed 100A1 Lloyd's Special Survey, and will be used for the Owners' Coal Trade. The machinery is of large power, and supplied by Messrs. George Clark, Limited, Sunderland. The vessel is being constructed under the superintendence of Messrs. Thompson, Eyres & Bryers, of Sunderland, on behalf of the owners.

Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.

AYDON. Trial Trip, April 18th. Steel screw steamer built to the order of Mr. Jas. E. Tully, of Newcastle-on-Tyne. Throughout the trial the performance of both ship and machinery proved satisfactory to all concerned. For Launch, see April issue.

Wm. Dobson & Co., Walker-on-Tyne.

RHODESIA. Launch, April 9th. Steel screw steamer, built to the order of The East Asiatic Coy., Ltd., of Copenhagen, and to the highest class at Lloyd's on the Awning Deck Principle. Designed to carry about 7,000 tons deadweight on a moderate draft of water. The dimensions are:—Length between perpendiculars 360 ft., breadth moulded, 51 ft. Depth moulded to awning deck, 30 ft. This steamer has been specially designed and fitted for the owners' trade between Scandinavian ports and South Africa.

William Doxford & Sons, Ltd., Sunderland

WELBECK HALL. Trial Trip, March 20th. A successful sea trial was run on this date, when an average speed of 11.86 knots was attained. For Launch, see March issue.

AZTEC. Launch, April 9th. Large single deck steamer, built to the order of Mr. Ragnvald Blakstad, of Christiania. This vessel carries oil in bulk in six large vertical cylindrical tanks, instead of the usual method in which the oil comes against the ship's side. The oil surfaces in this type of vessels are readily get-at-able, in case of leakages, and the space between the cylinders and the ship's side forms a series of natural cofferdams. Another advantage is that the cylindrical tanks can be removed in case of the oil freight market going down to an unpaying level, and the vessel used as an ordinary trader. The dimensions are:—Length 401 ft., breadth 53 ft., depth 32 ft. 9 ins., deadweight 9,000 tons of oil. The machinery, which has also been constructed by Messrs. William Doxford & Sons, is as follows:—Engines 26½ ins., 44 ins., 74ins. by 48 in. stroke, two single ended forced draught boilers, 16 ft. 3 ins. diameter by 11 ft. 8½ ins. long. These boilers are arranged to burn either coal or oil. The speed of the vessel will be 10½ knots, and she has been built to the British Corporation highest class under the superintendence of Capt. Helliesen, Messrs. Jack & Muers, and Mr. Kitts.

Osbourne Graham & Co., Sunderland.

CEMENTCRUG. Trial Trip, March 30th. On this date the builders sent to sea for her official trial-trip this steel screw steamer, which they have built to the order of Messrs. F. C. Svorono & E. di Pollone, of Mariupol, Russia. She carries 1,650 tons on a very light draught, and has been built to Lloyd's highest class. Machinery of large power has been supplied by Geo. T Grey, of South Shields, and on the trial everything was satisfactory, the contract speed being easily exceeded.

GRAZIELLA. Launch, April 9th. Steel screw steamer, constructed to the order of Messrs. Fearnley & Eger, of Kristiania. This is the seventh vessel the builders have constructed for the firm and the fourth of the Monitor type. Her principal dimensions are:—266 ft. by 37 ft. 9 ins. by 20 ft. 6 ins. moulded, and the vessel is on the single deck principle with poop, long bridge with accommodation on top, and forecastle. The vessel carries about 3,000 tons on a very shallow draught, and is equipped with the most modern deck appliances. She has been constructed under Special Rules to Norske Veritas Survey, and also fulfils the requirements of Sjfartskontoret Rules. Water-ballast is in both peaks and throughout double-bottom. Engines, which have been designed to drive the vessel at a high rate of speed are being supplied by Messrs. Richardsons, Westgarth & Co., having cylinders 19 ins., 31 ins., and 51 ins. by 36 in. stroke, with two large boilers, working at 180 lbs. pressure. A Cochran (Annan) Donkey Boiler, fitted with a patent seamless furnace has been fitted in this vessel. Messrs. Wailes, Dove & Co's. Patent "Bitumastic" Enamels have been applied throughout the bunkers, and their Patent "Bitumastic" Covering to the tank tops.

Northumberland Shipbuilding Co., Howdon-on-Tyne.

FRISIA. Trial Trip, April 17th. Steel screw steamer built to the order of the Hamburg-American Line. The trial proved in every way satisfactory, and a speed of 13½ knots was obtained. For Launch, see March issue.

Palmers' Shipbuilding & Engineering Co., Hebburn-on-Tyne.

SAN ZEFERINO. Trial Trip, March 19th. The trial was very successful, and the contract speed of 11 knots was exceeded. For Launch, see March issue.

Wm. Pickersgill & Son, Ltd., Sunderland.

EIBERGEN. Trial Trip, April 11th. The trial trip was satisfactory in all respects, a mean speed of 12 knots being attained on the measured mile. For Launch, see April issue.

J. Readhead & Sons, South Shields.

LINKMOOR. Launch, April 9th. Improved single deck type steel screw steamer, built to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne; and to Lloyd's highest class and under their special survey. Dimensions:—381 ft. by 51 ft. by 27 ft. 8½ ins., with poop, extra long bridge, and topgallant forecastle, fitted throughout with shifting boards and grain feeders in compliance with the requirements of the Grain Loading Act. A double bottom is provided for water ballast, as well as a large after peak tank. The vessel will be fitted with triple expansion engines, also constructed by Messrs. John Readhead and Sons, Ltd., having cylinders 26 ins., 42 ins., and 69 ins.,

with 48 ins. stroke, steam being obtained from two large steel boilers of 180 lbs. working pressure. There is also a large marine type donkey boiler. She has been constructed under the supervision of Mr. W. P. Henry and Mr. N. Blatchford, owners' superintendents.

ROSEMOOR. Trial Trip, April 9th. The trial trip gave every satisfaction to all concerned, and after the trials the vessel proceeded to Sunderland to load for Genoa, under the command of Capt. Pippet. She has been constructed under the supervision of Mr. W. P. Henry and Mr. N. Blatchford, owners' superintendents. For Launch, see April issue.

J. P. Rennoldson & Sons, South Shields.

DORALIA. Trial Trip. The official trial trip has been run of this new steel steam tug, built to the order of the United Steam Tug Company, of Gravesend. The tug has been specially designed for the general towing trade of the river Thames, and is capable of handling the largest type of ships. The dimensions of the *Doralia* are as follows :—Length 90 ft., breadth 22 ft., depth 11 ft. 9 ins. The propelling machinery is of the ordinary compound type, having cylinders, 18 and 40 ins. by 26 ins. stroke, fitted with direct steam reversing gear and all the most approved appliances. Steam is supplied by one extra large multitubular boiler of 140 lb working pressure. During the trial, which extended over a period of four hours, the working of the machinery was most efficient and satisfactory. A mean speed of 11½ knots was attained over the measured knot.

Sunderland Shipbuilding Co., Ltd., Sunderland.

DYKLAND. Launch, March 27th. This vessel, building to the order of Messrs. Fred Drughorn, Ltd., of London, under the supervision of Messrs. Flannery, Baggallay and Johnson, Ltd., of London, Liverpool and Rotterdam, is to Lloyd's highest class under the Single Deck Rule. Her principal dimensions are :—Length B.P. 370 ft., breadth 51 ft., and depth moulded 28 ft. 9 ins., driven by triple expansion engines by Messrs. George Clark, Ltd., of Sunderland, having cylinders 25 ins., 41 ins., and 69 ins. by 48 ins. stroke, taking steam from three cylindrical multitubular type boilers of ample power, working at a pressure of 180 lbs. per square inch. The vessel is being built on the deep frame system with clear holds to carry machinery of large size, and deck space kept clear for carrying tram cars, etc., and specially arranged for same. She is constructed to carry about 7,500 tons deadweight on Lloyd's summer freeboard, and is fitted with very complete and heavy winch and derrick gear for this class of vessel, including a 30 ton derrick.

VEENDYK. Trial Trip. This vessel has been taken to sea on her official trials, which proved most successful. A mean speed of 13¾ knots was obtained. For Launch, see March issue.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne.

IMBER. Trial Trip, March 10th. This vessel had a very successful trial trip, and immediately afterwards sailed to take up her station in the service carried on between Manchester, Liverpool, and Dutch and Belgian ports. The engines worked without the slightest hitch, propelling the vessel at a speed of 13 knots per hour. For Launch, see March issue.

VARELA. Launch, March 27th. A twin screw steamer, which is being built and engined to the order of the British India Steam Navigation Company, Ltd. The vessel is 390 ft. long, and is being constructed to attain the highest class in Lloyd's Register. She is intended for service between India and the Persian Gulf, and has accommodation for 32 first-class passengers in state-rooms on the promenade and shade decks. There will also be accommodation for 24 second-class passengers. The steamer will, in addition, carry a large number of native passengers on the upper deck. The vessel will be exceptionally well fitted, her outfit including double awnings all fore and aft, particularly good ventilation, electric light, wireless telegraphy, and refrigerating machinery. The propelling machinery consists of twin-screw triple-expansion engines, supplied by steam from six boilers working under forced draught, the whole being constructed at the Neptune Works. Messrs. Wailes, Dove & Co's. Patent "Bitumastic" Enamels have been applied throughout the bunkers, tanks, etc., and their Patent "Bitumastic" Covering to the tank tops.

R. Thompson & Sons, Sunderland.

BIARRITZ. Trial Trip, March 20th. The engines worked splendidly, a mean speed of 11 knots being easily attained, and entire satisfaction was expressed with both vessel and machinery. After the trial the vessel went in the Tyne to load for Havre, where the usual official French Government trials will be run. For Launch, see April issue.

Tyne Iron Shipbuilding Co., Ltd., Willington-Quay-on-Tyne.

ORLA. Launch, March 28th. Screw steamer, built to the order of Arvid Bergvall, Esq., Christiania. The vessel is built to class 100A1 at Lloyds with a single deck laid, and is of the following dimensions, viz. :—Length overall 366 ft., breadth extreme 50 ft. 9 ins., depth moulded, 27 ft. 4 ins., having poop, bridge and top gallant forecastle, and is designed to carry over 7,000 tons on a light draught. A large quantity of water ballast is carried all fore and aft in 6 tanks on the cellular double bottom principle; also in after peak. The vessel is constructed on the deep frame principle, with six steel bulkheads giving exceptionally clear holds, with large hatchways for the carriage of bulky cargoes, and also has a steel centre line bulkhead with wood shifting boards in way of hatches to meet the requirements of the Grain Cargoes Act. Special attention has been given to the quick discharge of cargo. The sanitary, ventilating and lighting arrangements are effected on the latest improved principle to meet Board of Trade requirements. Triple expansion engines, 25 ins., 41 ins., 66 ins., by 45 ins stroke, with three large single ended boilers 14 ft. diameter by 10 ft. 6 ins. long, 160 lbs. working pressure, which are fitted with superheating installation on the Schmidt system, the machinery being supplied and fitted by Messrs. The North Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne. Messrs. Wailes, Dove and Co's. Patent "Bitumastic" Covering has been applied to the tank tops in engine and boiler space.

Wood, Skinner & Co., Ltd., Newcastle-on-Tyne.

EDWIN HUNTER. Launch, April 8th. A steel screw steamer, specially designed for the carrying of coal cargoes, constructed to the order of Messrs. The Goole & West Riding Steam Shipping Co., Ltd., of Goole. The vessel is of the long raised quarter deck type with long bridge and top gallant forecastle, and is of the following dimensions, viz. :—Length B.P. 238 ft., beam 36 ft., depth moulded 16 ft. 3 ins. Ample provision for water ballast is made in the cellular double bottom all fore and aft, and in the fore and after peak tanks. The saloon and cabin accommodation is arranged under the bridge deck amidships, with chartroom and spare berth in deckhouse above, the officers and engineers being berthed in sidehouses under the after end of the bridge and the crew in the topgallant forcastle. The vessel has specially large self-trimming hatches, and will be fitted with all the latest improvements for the rapid handling of cargoes. She will also be fitted with a complete electric light installation by Messrs. The Northern Electrical Engineering Co., Ltd., of North Shields. Messrs. George Clark, Limited, of Sunderland, have constructed and will fit the propelling machinery, which consists of a set of triple expansion engines supplied with steam by two large steel multitubular boilers working at a high pressure. Both the ship and engines have been constructed to the requirements and under the special survey of Lloyd's for their highest classification, and have also been superintended during building by Mr. A. E. Smith, M.I.N.A., of Goole. Owing to the indisposition of that gentleman, he was unable to be present at the Launch, but was represented by Mr. George H. Strong, M.I.N.A., consulting surveyor, of Hull. The ceremony of christening the vessel was very gracefully performed by Mrs. C. M. Ezard, wife of Mr. C. M. Ezard, of the firm of Messrs. H. W. & C. M. Ezard. Amongst those present were Mr. E. W. Hunter (chairman of the Goole & West Riding Steam Shipping, Co., Ltd.), Messrs. B. Brown, A. Blyth, J.P., and H. W. Ezard (Directors), Messrs. C. M. Ezard, W. Best and W. E. Hunter, Miss Brown, Mrs. & Miss Blyth, Mrs. & Miss Farnhill, Mrs. & Miss Best, Miss E. Hunter, Mrs. W. E. Hunter, Mr., Mrs. & Miss Strong (Hull), and

Mr. W. E. Spence, of Messrs George Clark, Limited (The Engine Builders).

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Thornaby-on-Tees.

MELANIA. Launch, March 27th. Two deck screw steamer. Dimensions :—427 ft. by 53 ft. 4 ins. by 31 ft. to upper deck. Built of steel to the highest class in Lloyd's Registry, under special survey, for the carrying of oil in bulk, there being nine tanks with a centre oil-tight division forming 18 compartments for oil cargo, each having large expansion trunk in 'tween decks. For the provision of carrying lighter oil in summer there are five summer tanks on each side of the 'tween decks, whilst oil fuel is carried in the cross bunker aft, and in the fuel tank forward. Water ballast is fitted in double bottom under engines and boilers in both peaks. The engines are of the triple expansion type, and have been constructed by The North Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 27 ins., 45 ins., 74 ins., by 48 ins. stroke, with three large boilers working at 180 lbs. pressure, fitted with Howden's forced draught, and Schmidt's superheater. A double set of oil pumps are being fitted in the pump room amidships capable of dealing with 600 tons per hour. A complete installation of electric light on the double wire system has been fitted throughout by Messrs. Falconar, Cross & Co., Newcastle. A Marconi wireless installation is being fitted in special room on the bridge. The vessel, which has all the latest arrangements and improvements for carrying oil in bulk, including heating coils, exhaust pipes, etc., has been built to the order of The Anglo-Saxon Petroleum Co., Ltd., London. The vessel has been built under the supervision of Mr. C. Zulver, Marine Superintendent of the Company, assisted by Mr. A. Taphouse, and Mr. A. Barnett. This is one of the largest oil tank steamers Messrs. Craig, Taylor & Co., Ltd., have as yet built.

Wm. Gray & Co., Ltd., West Hartlepool.

ANERLEY. Launch, March 27th. Built to the order of Messrs. Howard Houlder & Partners, Ltd., London, for the Bulk Oil Carrying Trade, and to the highest class in the British Corporation Registry. Dimensions :—Length overall 377 ft., breadth 50 ft. 9 ins., depth 29 ft. 3 ins. The *Anerley* is unique, being the first vessel launched to carry oil in large cylindrical tanks instead of ordinary holds with straight bulkheads. Great advantages are expected from this method of construction and being free from numerous webs and other stiffeners, the cylindrical tanks are easily cleaned down. The deck is formed with a large expansion trunk carried from the poop to the forecastle in which the oil will rise and fall with varying temperatures. The vessel is very strong and safe, having numerous separate compartments in addition to a double bottom throughout. Two large pumps made by the Central Marine Engine Works are fitted in separate pump rooms for dealing with the oil and also to pump water for ballast when not carrying oil. There is a complete system of piping through which any tank can be emptied whilst others are being filled. There are also steam heating pipes throughout the oil compartments to ensure heavy oils flowing freely through the pipe lines. The bunkers are constructed to carry coal or oil fuel. Separate steaming out pipes for cleaning the tanks and pipes for fire extinguishing are also being fitted. Electric lighting will be installed throughout and the accommodation will be heated by steam to avoid risk of fire. Direct steam windlass, steam winches, steam steering gear and hand gear, two masts, schooner rigged, and all necessary outfit for her special trade, are provided to fulfil British and Norwegian regulations. The machinery has been made at the Central Marine Engine Works of the builders. It is of the triple expansion type, having cylinders 25 ins., 41 ins., and 68 ins. diameter, with a piston stroke of 48 ins., and placed in the after part of the vessel. There are three large steel boilers adapted for 180 lbs. working pressure per square inch, and fitted with an oil burning installation. A special system of "Cmew" auxiliaries, including a winch condenser, evaporator, independent feed pumps, fitted with a suction filter, direct contact overhead feedheater, oil film heater, oil fuel pumps, etc., will be installed in the engine room. The ship and machinery have been built under the superintendence of Messrs. Jack and Muers, London.

ARNOLD MAERSK. Trial Trip, March 31st. A very satisfactory trial trip was run, a speed of 11 knots being obtained; the vessel afterwards proceeded to the Tyne to load, under the command of Captain Hans Maersk-Moller. For Launch, see April issue.

CITY OF RANGOON. Launch, April 9th. Steel screw steamer built for the Hall Line Section of the Ellerman Lines, Ltd., Liverpool, and to the highest class in Lloyd's Register. Dimensions :—Length overall, 457 ft. 6 ins., breadth 55 ft. 3 ins., and depth 34 ft. The vessel has a cruiser stern, and will be equipped for wireless telegraphy. She has two decks laid, long poop, bridge and topgallant forecastle and very tasteful cabin accommodation in houses on the bridge deck for passengers, captain, officers and engineers, and the crew's accommodation in the poop. An electric lighting installation is fitted throughout the vessel. The cellular double bottom extends from stem to stern, and a deep tank hold compartment is fitted for water ballast abaft the engine room, giving a total capacity for water ballast of about 2,300 tons. The whole of the equipment is of the most approved description, including sanitary tanks, fresh water distiller, steam windlass, steam steering gear, fifteen steel derricks, thirteen steam winches, with return exhaust to winch condenser of the "Cmew" type. Triple engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25¾ ins., 44½ ins., and 77 ins. diameter, with a piston stroke of 51 ins., and three large steel boilers of the flanged sheet type, adapted to work at a pressure of 220 lbs. per square inch, and fitted with Howden's system of forced draught. A special feature of the boiler installation is the "Cmew" type superheater, designed and made by the engine builders with a view to utilizing to the utmost the heat from the gases on their way to the funnel. Also an arrangement of heating the boiler feed water by means of the exhaust steam from the auxiliaries so that heat that would otherwise be wasted is utilized to the best advantage in reducing the consumption of coal. The engine room auxiliaries are very complete, and include an auxiliary condenser evaporator, feed and ballast pumps, gravitation feed water filter, feed water purifier and grease separator, all of the "Cmew" type. The ship and machinery have been built under the superintendence of Mr. Alexander Dalrymple assisted by Mr. Robert Sharp.

Irvine's Shipbuilding & Dry Docks Co., Ltd.,

MOBILE. Trial Trip, March 23rd. On this date the *Mobile* proceeded to sea for her official trial; the weather conditions were not suitable for a speed trial, but the engines and all auxiliaries worked very satisfactorily. For Launch, see March issue.

ORANGE RIVER. Trial Trip, March 31st. On the above date this vessel proceeded on her official trial trip. The vessel has been built to the order of Messrs. Furness, Withy & Co., Ltd., for the British Empire Steam Navigation Co., Ltd. The dimensions are :—400 ft. in length, by 52 ft. beam extreme, by 29 ft. 6 ins. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation Classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade Regulations. Four large hatches are provided, and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including 10 steam winches exhausting into a tank in the engine room, and ten derricks. A powerful quick-warping steam windlass is fitted forward, and combined steam and hand steering gear on the Wilson & Pirrie principle is fitted in a house aft, with telemotor attachment to the bridge. A large ice house is also fitted for the crew's provisions, etc. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons'" Standard triple expansion engines, having cylinders 25 ins., 40 ins. and 68 ins. by 48 ins. stroke, with three large boilers working

at a pressure of 180 lbs. per square inch. The condenser is of the Contraflo type with air pump temperature regulator, and the engine room auxiliaries include a Contraflo winch condenser, cascade feed water filter and heater, a Morison Evaporator, large ballast, donkey and harbour feed pump, etc. Throughout the trial the engines and all auxiliaries worked admirably, and on several runs on the Whitley Bay measured mile a mean speed of 12 knots was obtained.

PENGREEP. Launch, April 8th. Steel screw steamer, built to the order of R. B. Chellew, Esq., Truro. Dimensions :—402 ft. 6 ins. in length by 52 ft. beam extreme, by 26 ft. 6 ins. depth moulded, carrying over 8,000 tons on a moderate draft. She is built to Lloyd's highest class, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Steel grain divisions are fitted throughout the holds with wood shifting boards in way of the hatches according to the latest Board of Trade Regulations. Four large hatches are provided, and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including 10 steam winches exhausting into a Contraflo Winch Condenser, and 10 derricks. A powerful quick warping steam windlass is fitted forward, and steam steering gear is fitted amidships with hand screw gear aft. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25½ ins., 42 ins. and 70 ins. by 48 ins., with three large boilers, working at a pressure of 180 lbs. per square inch. The hull and engines have been constructed under the superintendence of Mr. John Chellew, of Cardiff, and Mr. R. R. Rapson.

Ropner & Sons, Ltd., Stockton-on-Tees.

GREAT CITY. Trial Trip, April 3rd. After some very satisfactory trial runs, during which the vessel attained a speed of about 12 knots, she proceeded to New York, under the command of Captain J. H. Smith. The vessel has been fitted with a Ramsay Anticipating Governor. For Launch, see April issue.

DEMETERTON. Launch, April 9th. A steel screw steamer of the following dimensions, viz :—Length 429 ft., breadth 55 ft., depth 34 ft. 7¼ ins. The vessel will be classed 100A1 at Lloyd's, having main deck, and complete awning deck fore and aft. The vessel has been built to the order of Messrs. R. Chapman & Son, Newcastle, and has double bottom for water ballast on the cellular principle all fore and aft, and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including powerful quick-warping steam windlass, stockless anchors, powerful steam steering gear amidships, and strong screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete. The engines will be of the triple expansion type, by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,000 I.H.P., having two steel boilers, 16 ft. 9 ins. by 11 ft. 6 ins.; also large auxiliary boilers, all working at 180 lbs. pressure. Messrs. Wailes, Dove & Co's. Patent "Bitumastic" Enamels have been applied throughout the bunkers, engine and boiler room tanks, bilges, etc.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

BURESK. Launch, March 25th. Steel screw steamer. Dimensions :—Length overall, 394 ft., breadth extreme 51 ft., depth moulded 27 ft. 3 ins., tonnage, gross, about 4,220 tons, D.W. about 7,560 tons. Built to the order of Messrs. Burdick & Cook, of London, will class 100A1 in Lloyd's Register, and has been built under special survey. She is of the single deck type, and has a cargo poop, and long bridge amidships. A cellular double bottom throughout, and forward and after peak tanks, are fitted for water ballast; and equipment includes large horizontal multitubular donkey boiler, eight steam winches, steam steering gear, steam windlass with quick warping ends, stockless anchors, and all modern improvements for facilitating loading and discharging. The engines, by Messrs. Blair and Co., Ltd., have cylinders 26 ins., 42½ ins., 69½ ins. by 45 ins. stroke, steam being supplied by two single ended boilers having a working pressure of 180 lbs. This makes the 22nd steamer that has been built to the order of Messrs. Burdick & Cook. Messrs. Wailes, Dove & Co's. Patent "Bitumastic" Enamels have been applied throughout the bunkers, tanks, etc., and their Patent "Bitumastic" Covering to the Tank Tops.

SOUTH OF ENGLAND.

Day, Summers & Co., Ltd., Southampton.

TOWY. Trial Trip, April 8th. The trial trip of this vessel was successfully carried out. The vessel obtained a mean speed on the measured mile at Stokes Bay of 9.96 knots, carrying 90 tons of cargo in the hold. The speed guaranteed being 9 knots. For Launch, see April issue.

TAFF. Launch, April 9th. This Company also launched for the same owners a second vessel, the s.s. *Taff*, the engines and boiler being shipped the same morning as the launch.

WEST OF ENGLAND.

Edward Finch & Co., Ltd., Chepstow.

CAISSON. Recently constructed for the Table Bay Graving Dock, to the order of the High Commissioner for the Union of South Africa, and has now been shipped at Newport for Cape Town. The principal dimensions are :—Length 69 ft., breadth 27 ft., depth 37 ft. The total weight is 550 tons.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

LORD MINTO. Launch, March 1st. Steel screw trawler. Dimensions :—136 ft. 6 ins. by 23 ft. 3 ins. by 13 ft. moulded. The vessel has been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

ADMIRAL CRADOCK. Launch, March 28th. Steel screw trawler. Dimensions :—136 ft. 8 ins. by 23 ft. 3 ins. by 13 ft. moulded. The vessel has been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

HOLYROOD. Launch, April 9th. Steel screw trawler. Dimensions :—115 ft. by 21 ft. 6 ins., by 11 ft. 6 ins. moulded. The vessel has been built to the order of Messrs. The Queen Steam Fishing Co., Ltd., Hull, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes and Co., Ltd., Hull.

SCOTCH.

Ailsa Shipbuilding Co., Troon.

GLEN USK. Launch, April 12th. A paddle steamer, built to the order of Messrs. P. & A. Campbell, Bristol, and intended for that Company's passenger service between Bristol, Newport and Ilfracombe. Dimensions :—Length 224 ft. 6 ins., breadth, 28 ft., depth 9 ft. She has been built to meet the Board of Trade requirements for a limited No. 2 passenger certificate. A promenade deck extends the full length of the vessel, the sides being plated up to the height of the promenade deck, and large circular side lights are fitted. The machinery, which is being supplied by the builders, consists of a set of compound diagonal paddle engines, having cylinders 26½ ins. and 52 ins. diameter and a stroke of 54 in. Steam is supplied by a large single ended return-tube boiler worked under forced draught.

SNIPE. Launch, April 12. A small single-screw steam yacht, built for Sir Archibald E. Orr Ewing, Bt. The yacht, which has been designed by the builders, was launched with steam up and ready for trials. She has been built in accordance with Lloyd's requirements for their highest class yacht rules, and presents a very handsome appearance. The accommodation for owner and guests is aft, and consists of a large saloon tastefully panelled in hardwood and finished throughout in white enamel. The deck over the saloon forms a fine promenade for the owner and his guests. The machinery, which has been supplied by Messrs. M'Kie & Baxter, Glasgow, consists of a set of compound inverted direct-acting surface-condensing engines, and steam is supplied by a large, single-ended, horizontal, return-tube boiler, worked under natural draught.

Barclay, Curle & Co., Whiteinch.

BAMORA. Launch, April 7th. Screw steamer, built for the British India Steam Navigation Company's Eastern service. The *Bamora* is the second vessel completed in the new yard. She is 330 ft. in length, 46 ft. in breadth, 23 ft. in depth, and of 3,300 tons gross. She is the second of three sister ships which the firm contracted to build for the British India Company, and is similar to four others which they have constructed for the same company's Persian Gulf trade. The engines will be supplied by the builders.

Caledon Shipbuilding & Engineering Co., Dundee.

FORMBY. Launch, April 9th. Screw steamer—the twenty-third vessel the builders have constructed for the Clyde Shipping Company, Glasgow. The dimensions of the vessel are:—Length overall 279 ft., breadth moulded 36 ft., depth moulded 17 ft. 6 ins., and tonnage about 1,400. She is built to take the classification of the British Corporation Registry. The upper and lower twin decks are fitted up for the carriage of cattle, while the lower holds are insulated for the carriage of dairy produce. The *Formby,* which is intended for the Irish cross-Channel trade, will also have fine passenger accommodation.

BELIZE. Launch, March 25th. Twin-screw coastal mail steamer for the Royal Mail Steam Packet Company. Her sister vessel, *Barima,* will shortly leave to take up her position in the Trinidad-Tobago mail service. The principal dimensions of the *Belize* are:—Length 230 ft., breadth 37 ft., depth moulded to shelter deck 20 ft. 6 ins.; gross tonnage, about 1,500. The engines are of 1,200 i.h.p., and provision has been made for the use of either coal or oil fuel. The vessel is rigged as a two-masted schooner, and has been constructed to the highest class of Lloyd's Registry and under their special survey. Passenger accommodation of a superior character has been arranged for 30 first and 30 second-class, and provision is also made for a number of deck passengers. Although the *Barima* and *Belize* are not big vessels, they are considerably larger than the *Kennet,* at present employed on the Trinidad-Tobago mail service.

Charles Connell & Co., Scotstoun.

NAVIGATOR. Launch, March 25th. A screw steamer, about 3,800 tons gross, built to the order of Messrs. Thos. and Jas. Harrison, Liverpool. The vessel has been constructed to Lloyd's highest class, and is fitted with all the latest appliances for the rapid and efficient working of cargo. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and pipes with their Patent Non-Conducting Composition. Triple-expansion engines, with all the latest improvements, are being supplied by Messrs. Dunsmuir & Jackson, Glasgow.

Dunlop, Bremner & Co., Port-Glasgow.

SANTA THERESA. Launch, April 9th. Single-screw steamer for the Santa Clara Steamship Company, Liverpool. The vessel, which is about 2,150 tons gross, is 290 ft. in length, 42 ft. in breadth, 21 ft. 6 ins. in depth. The builders will supply triple-expansion engines. Both the hull and the machinery were constructed under the superintendence of Messrs. G. S. Goodwin & Company, consulting engineers, Liverpool.

Fleming & Ferguson, Paisley.

SIR WILLIAM MATTHEWS. Launch. Twin-screw bucket-ladder hopper dredger, built to the order of the Crown agents for the Colonies for the Port of Colombo. The vessel has been constructed under Lloyd's Special Survey to Class 100 A1, and is one of the most powerful and finest equipped vessels of her kind afloat. She was designed by, and has been built under the superintendence of Messrs. Coode, Matthews, Fitzmaurice and Wilson, London, Mr. Robert Anderson, Renfrew, being resident inspecting engineer.

Greenock & Grangemouth Dockyard Co., Grangemouth.

MINISTRO EZCURRA. Launch, April 11th. An oil tank steamer, built to the order of the Argentine Government for service in providing fuel for the Argentine Navy. The vessel has been designed by the builders to fulfil the requirements of this very special service—a service with which they are familiar, as they designed and built the royal fleet auxiliary, *Burma,* for the British Admiralty for similar work. As the *Burma* was the first oil carrier specially designed and built for the British Navy, so the *Ministro Ezcurra* is the first for the Argentine Navy. Dimensions:—Length 260 ft., breadth 40 ft., and depth 20 ft. 9 ins. She is classed under Lloyd's Survey, and is of the single-deck type, with long poop and forecastle. The pumping installation, arrangements for loading and discharging the oil, for keeping it heated during transit, and the deck and electrical equipment are all of a specially complete and efficient character. Machinery designed for a good rate of speed, with boilers to burn oil fuel, will be supplied by Messrs. Cooper & Greig, Dundee. The inspection of the vessel during construction has been directed from the Argentine Naval Commission, London, through a local commission of three officers of the Argentine Navy.

Wm. Hamilton & Co., Ltd., Port Glasgow.

BOLTON CASTLE. Launch, April 14th. A screw steamer for the Lancashire Shipping Company, Liverpool (James Chambers & Co., managers). The principal dimensions are:—Length 440 ft., breadth 53 ft., depth 32 ft. 6 ins., to upper deck, and deadweight 9,200 tons. The vessel is fitted with all the latest arrangements for the rapid handling of specially heavy cargoes, and is classed with Lloyd's Register for their highest class longitudinal framing. Triple-expansion engines are being supplied by Messrs. D. Rowan & Co., Glasgow. During construction the hull and machinery have been superintended on behalf of the owners by Mr. E. H. Bushell, Captain Lightoller and Mr. Sutcliff.

Harland & Wolff, Ltd., Glasgow.

EGBA. Trial Trip, April 4th. This steel screw steamer, built to the order of the African Steamship Company, left the builders' fitting-out basin at Govan, and after satisfactory trials proceeded to Liverpool. For Launch, see January issue.

D. & W. Henderson & Co., Ltd., Partick.

KALIMBA. Trial Trip, March 21st. During the trials on the Firth of Clyde, everything worked to the satisfaction of the owners and builders, a mean speed of fully 11½ knots being easily attained. For Launch, see March issue.

Messrs. Arch. McMillan & Son, Ltd., Dumbarton.

RIOUW. Trial Trip, April 7th. The trials proved in every way satisfactory, and a mean speed of 14½ knots was obtained on the measured mile. For Launch, see March issue.

HOLSATIA. Launch, April 9th. Steamer, built for the Hamburg-Amerika Linie of Hamburg. The vessel, which is of the following dimensions:—Length 429 ft., breadth 56 ft., depth moulded 30 ft. 9 ins., is of the 'tween deck type, with poop, bridge and forecastle. The propelling machinery will be supplied by Messrs. David Rowan and Co., Glasgow. Both vessel and machinery have been built under the special survey of Lloyd's Register for their highest class. During construction the vessel has been under the supervision of Mr. Waack, the Owners' Representative.

Noble & Co., Fraserburgh.

VIOLET FLOWER. Launch, April 11th. A large wooden steam drifter for Messrs. James Gay, James Strachan, Thomas Strachan, and Thomas Buchan, Peterhead. The vessel measures 90 ft. overall and 19 feet beam. Triple-expansion engines will be supplied by Messrs. John Lewis and Sons, Aberdeen.

Ramage & Ferguson, Leith.

TRANSVAAL. Trial Trip. This steamer has completed trials. A speed of over 12 knots was obtained over the measured mile at Aberlady. The engines developed 1,650 horse-power, and everything worked in a satisfactory manner. The *Transvaal* is the largest steamer ever built at Leith. For Launch, see March issue.

Messrs. Russell & Co., Port Glasgow.

CAMPERDOWN. Launch, April 20th. Steamer built to the order of Messrs. Glen & Co., Glasgow. The vessel, which has been constructed to the highest class of the British Corporation, is 331 ft. in length, 49 ft. in breadth, and 24 ft. 3½ in. in depth, and about 3,100 tons gross. The Clyde Shipbuilding and Engineering Co., Port Glasgow, will supply the machinery. During construction the steamer was under the supervision of Mr. W. Evitt, the owners' superintendent engineer.

Alex. Stephen & Sons, Ltd., Linthouse.

TANDA. Launch, March 26th. Twin screw steamer, for the Eastern Service of the British India Steam Navigation Co., Ltd. Dimensions :—Length 430 ft., breadth 58 ft., and depth 40 ft. Accommodation will be fitted for about 100 first and second-class passengers and a large number of native passengers. Her cargo gear and outfit are of superior type, as usually supplied to the British India Co. The propelling machinery consists of two sets of triple expansion engines, with five large single-ended boilers, all constructed at Linthouse. Messrs. Wailes, Dove and Co's. Patent "Bitumastic" Enamels have been applied throughout the double bottom, coal bunkers, etc., and their Patent "Bitumastic" Covering to the tank tops.

IRISH.

North of Ireland Shipbuilding Co., Londonderry.

KEYNOR. Launch, April 7th. Steamer, built for the Canadian Transportation Company, Montreal. The vessel is 250 ft. long, and has a deadweight carrying capacity of 2,300 tons. She has been built to Lloyd's highest class for service on the St. Lawrence River and Great Lakes.

Workman, Clark & Co., Ltd., Belfast.

CITY OF VIENNA. Launch, March 17th. Steamer, built for the Hall Line Branch of the Ellerman Lines, Ltd. The new vessel is 434 ft. in length, with a gross tonnage of over 6,000 tons, and has been built under British Corporation survey for the highest class in their Registry. The cargo space is divided into four large holds and two smaller holds, one of which is intended for use as a reserve bunker, and the other being prepared for use as a deep water ballast tank. By the adoption of the girder system of construction these cargo spaces are practically free of obstruction, and are capable of receiving the largest type of cargo consignments. The hatchways to these holds are large and are fully equipped with all the necessary appliances for handling heavy cargo. The propelling machinery consists of a set of triple expansion engines with the necessary auxiliary appliances, steam being supplied by three single-ended steel boilers working under forced draught. There is a wireless installation provided.

CITY OF EXETER. Launch, April 1st. Twin screw steamer, designed and built for the City Line Fleet of the Ellerman Lines, Limited, this being the seventeenth vessel built by this firm for the City Line. This handsome new steamer will prove an important acquisition to the passenger service between Great Britain and India, and is admirably adapted for the special requirements of the Indian Passenger Service. Her length is 502 ft., with a gross tonnage of 9,300, and has been built under the special survey of the British Corporation of Shipping for their highest class, and also fulfils the requirements of the British Board of Trade for a first class passenger and cargo steamer. In designing the vessel special attention has been given to the arrangement of the passenger accommodation, and the result is an excellent combination of comfort and artistic taste for all classes. The lavatory accommodation throughout the vessel is of the most modern character, and includes a number of spray and shower baths. Other features of interest include the wireless telegraph room, a barber's shop, a steam laundry, and a baggage room, accessible at all times for the storage of passengers' luggage. In connection with the galleys and pantries, which are provided with the most modern appliances, cold chambers have been arranged, with suitable refrigerating plant, for the preservation of provisions and vegetables required for use during the voyage. An efficient system of steam heating is fitted throughout the accommodation, and all the rooms are well ventilated, so as to ensure the utmost comfort in the hottest climate. The cargo space is divided into six holds, one of which is arranged for use, when required, as a deep water ballast tank. Owing to the adoption of the girder system of construction these holds are free of obstruction, and are thus capable of receiving the largest type of consignments. The propelling machinery consists of two independent sets of quadruple expansion engines of approved design, balanced on the Yarrow, Schlick and Tweedy principle, so as to reduce vibration to a minimum. Steam is generated in three steel cylindrical boilers working under forced draught.

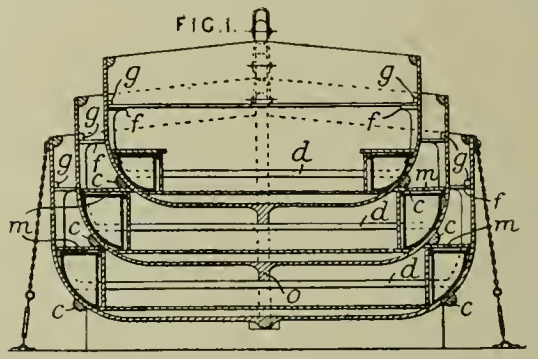
STAR OF ENGLAND. Trial Trip, April 6th. The new twin screw steamer, constructed for the Commonwealth and Dominion Line, Ltd., of London, left Belfast Harbour for machinery tests and speed trials. The results proved highly satisfactory, and the vessel then returned to the Harbour, and shortly after left for bunkering, thereafter proceeding to London to take in cargo for the maiden voyage to Australia. For Launch, see March issue.

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

Boats adapted for nesting. No. 28,909.—Nested boats are stiffened by transverse frames *d* which fit the contour of the bilges and terminate in bearing-plates *f* and keys *g* for the removable seats. Side seats *m* are arranged to engage with

FIG. 1.



bilge keels *c* on the inner boat, and the keel *o* of the inner boat just rests on the frames *d*. Water-tight chambers at the bow and stern are charged with blaugas and are fitted with lamps.

Turbine Marine installations. No. 29,190. Relates to turbine installations for marine propulsion with four propellers, and consists in placing the starboard high-pressure turbine *a* on the outer shaft, the starboard low-pressure turbine *c* on the inner shaft, the port high-pressure turbine *d* on the inner shaft, and the port low-pressure turbine *b* on the outer shaft, as shown in Fig. 1. The exhaust from the turbine *a* goes to the turbine *c*, and the exhaust from the turbine *d* to either or both low-pressure turbines, *b*, *c*. By coupling the turbines *d*, *c*, the two inner shafts only are rotated. For

Fig 1.

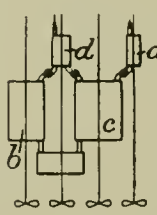
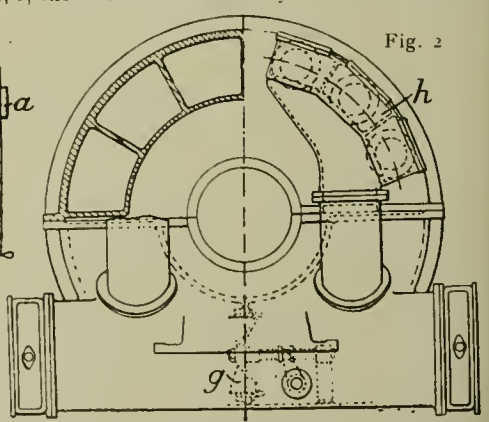


Fig. 2



economy, larger turbines are provided on the inner shafts than on the outer. In order to equalize the powers obtained from the turbines under varying conditions, the supply to the turbine *c* is controlled by a valve *g*, Fig. 2, which, when shut, directs the exhaust from the two high-pressure turbines to their respective sides of the turbine *c* itself, and when open allows the steam to go to both sides. The inlet nozzles are controlled by valves *h*, whereby the number of inlets in use, and also the pressure in the receiver, can be regulated.

The Marine Engineer
And Naval Architect.
LONDON, JUNE, 1914.

HIGH-POWER DIESEL ENGINES.

AS time has gone on, many of the hopes as to the practical performance of the larger type of Diesel engines, particularly those used for marine purposes, have failed to be realized to the expected extent. Many of these hopes have been based on the actual performance of Diesel engines on shore, but of much smaller size than those necessary for use on board ship, and to some extent the disappointment which has followed has been brought about on this ground. A very interesting and exhaustive paper on the subject under the title of "High-power Diesel engines and their development for marine service," has been read by Mr. James Richardson at the April meeting of the Junior Institution of Engineers. The paper being lengthy and the diagrams and tables extensive, we do not propose to give it in detail, but the method of treatment of the subject and the conclusions arrived at are so important that we think our readers will be interested to have the general points set out as the result of the author's careful examination of the subject, from the records of the past. The many reasons for the non-fulfilment of the expectations are set out by the author in summary. In the first place, theoretical considerations apart from foundry work were given, as is frequently the case with Continental engineers, pre-eminence in comparison with those practical factors which must be of the most vital importance where marine work is concerned. In the second place, owing to the economic conditions abroad, the oil engine is largely developed for land purposes, and owing to the optimism which is generally felt as to the position developed and to the want of reference to the opinions of marine engineers, land engines were applied to marine work without the necessary modifications. Again, the necessary increase of the sizes of the units for marine work were carried out, owing to over-ambition, without sufficient knowledge of the many difficulties, which are intensified out of all proportion to the increase of power per unit. Lastly, but by no means least, it is clear that many constructors failed to realize fully the importance of, and to apply practically, scientific experimental work and research.

It may be said that, although these are the main causes of the retardation of the progress of the Diesel engine for marine propulsion, from these it must not be inferred that no success has been achieved, a fact that is borne out by the recorded performance of a certain number of marine installations of the Diesel type. In analysing the matter, however, it is quite clear that the firms who have been successful are those engaged in marine engineering, and their success has been ensured to a large extent by the careful and conservative methods they have adopted. For instance, the four-stroke cycle has been rigidly adhered to. The increase of power has generally been attained by adding to the number of separate units rather than by risking the disproportionate augmentation of difficulties consequent upon an increase in the size of the unit, and further prices have not been cut, weight has not been sacrificed, and simplicity has not been forced, hence success has resulted from their efforts.

In discussing the possible direction of improvements in the future the author points out some important factors which might be taken into consideration. He suggests that the limits of temperature and the means by which the mean effective pressure in the future may be augmented are:—Firstly, a higher overall efficiency of the plant, by the injection of the fuel more economically with reference to the amount of high-pressure fuel injection air required. Secondly, greater turbulence of the combustion air into which the fuel is injected, giving more spontaneous combustion. Thirdly, artificial raising of the exhaust pressure against which the engine must exhaust, so automatically raising the scavenging air pressure and all the pressures of the cycle. Fourthly, an increase in mechanical efficiency by accomplishing more work in the cylinder at an advantageous part of the stroke, although this would inevitably be accompanied by a loss of thermal efficiency. Fifthly, rapid compression, permitting of the minimum amount of heat to be transmitted from the air to the cooling water through the cylinder walls on the compression stroke. Sixthly, increase in the volumetric efficiency of the charge by means of the double-port method of scavenging, permitting the upper ports to charge the cylinder at a high pressure, and seventhly, introduction of high-pressure air on the expansion stroke to permit of burning more fuel and to give thus an overload.

The author, in dealing with the practical aspect of the suggestions, points out that the first and fourth suggestions can be carried out by a special arrangement of fuel valves; by the adoption of a multiplicity of valves, one valve only, preferably the most centrally disposed one, is required for the use of highly compressed air for the injection of the fuel and is capable of delivering the proper amount of fuel for sufficient power for the slowest speed desired, while the remaining valves can be adapted to deliver the fuel against a lower pressure into the flame of the burning fuel delivered by the first valve. In this way the compressor capacity may be reduced and, whilst retaining the Diesel cycle for the one valve, the main fuel is separately ignited, and thus the work is done at a later part of the stroke and more advantageous conditions as regards mechanical efficiency are established. Turbulence of the combustion air, as set out in the second suggestion, may be effected either by means of spiral spraying, such as is adopted with oil fuel burners for boilers, or by setting the fuel valves tangential to an imaginary circle in the combustion space. The artificial raising of the exhaust pressure, indicated in the third suggestion, can be readily effected by the provision of a throttle valve in the exhaust main. Rapid compression, indicated in the fifth suggestion, is quite easy to attain with engines of the Junkers opposed double-piston type. The practical method of dealing with the sixth and seventh suggestions requires no further explanation, as many obvious methods can be adopted for effecting the purpose.

In dealing with the subject of internal water cooling the author states that the Hopkinson method, which was described in the proceedings of the Institution of Mechanical Engineers in July, 1913, is worthy of consideration, effecting, as it does, simplicity of cylinder, cylinder head and piston castings. The author

states that so far this method has been applied only to horizontal gas engines. It may be well to state that the method consists of cooling the walls of the combustion space in lieu of external water jackets and their complications by the arrangement of jets of water, which water is evaporated on the surfaces to be cooled and so preventing the heat from passing through those walls, while the amount of water used is such that all of it is evaporated into steam on reaching the surfaces. The resultant steam will form a source of power usually thrown away in the cooling water by the raising of its temperature, and, on this account, the efficiency should be increased. However, on the other hand, it must not be forgotten that the water may take some heat from the flame, retarding combustion and lowering the efficiency. The result of actual tests tends to show that the efficiency remains the same with this method as with water jackets, or putting it another way, the expected gain in efficiency due to the water evaporation in cooling the surfaces is counter-balanced by the drop in maximum pressure. Practical working shows that the amount of water consumed in this method of cooling is about 2·4 lb. per brake horse power per hour. In dealing with the application of this method of cooling with a vertical two-stroke high-power marine engine some difficulties and inconveniences are likely to arise, such as the following: distilled water would be used, and the production of a sufficient quantity is costly, requiring also cumbersome apparatus; use would be made, no doubt, of an exhaust boiler. With the Diesel engine, the high compression necessitates a small clearance or compression volume, so that the form of the combustion space does not lend itself to jet cooling. Several jets would probably be necessary. As the heat of combustion is relied upon entirely to ignite the fuel, it might not be advisable to inject the water into the compression space until the fuel had been ignited, although the higher temperatures all over at which the engine would run might negative this condition. In any case, the head of the engine must be water-cooled, owing to the difficulty of causing the water jet to play on that surface, and because of the difficulty of cooling the fuel-injection valve without a water jacket. In any case, the exhaust port bars would require to be water-cooled.

THE CLYDE'S FIRST SUBMARINE.

MUCH interest has entered, so far at least as Clydeside industrial circles are concerned, in the trials of the submarine *S* 1, which is the first craft of the submarine, or submersible, kind yet constructed in Scotland, or indeed in Great Britain, with the exception, of course, of Barrow-in-Furness and the Royal Dockyards. The vessel was launched by Scott's Shipbuilding and Engineering Co., Ltd., Greenock, on February 28th, and is of the "Laurenti" type, for the construction of which Scott's Company have acquired the licence in Britain. She is the first submersible of the "Laurenti" type to be built in Britain, and a few particulars of the hull construction and of the media of propulsion will not be without interest.

A special feature of this type of submersible is the double hull—the outer to give the highest propulsive efficiency and reserve buoyancy on the surface with the minimum draught, and the inner, which is divided into water-tight compartments, to minimize the internal cubic capacity while ensuring satisfactory conditions under water. The double skin, which is braced with stays to ensure the maximum structural strength, is confined largely to the central part, and the space between the shells up to the water-line on surface displacement is utilized to form water ballast tanks for submergence. Valves are fitted at the turn of the bilge on each side for the flooding of the water ballast compartments. The water can be pumped out without danger of collapse due to the pressure of sea water on the outer skin, but compressed air can be, and is normally, used for expelling the water when the boat is to return to the surface.

Another feature of the vessel is the keel, which weighs about 12 tons, and which is detachable from the interior so that the weight can be decreased while under water. "Escapes" are provided for use in case of accident. An ingenious arrangement is fitted for the establishment of communication from the surface to the crew below. The torpedo tubes are situated forward under the bow.

The machinery for surface propulsion consists of two sets of six-cylinder oil engines, of the Fiat type, and are situated on either side of the centre compartment. Adjoining the engine-room are the electric motors for submerged propulsion. No official information is available regarding the actual dimensions or the design of the vessel, but it may be mentioned that the vessel is of the same type as those built last year by the Fiat San Giorgio, of Spezia, and which have been adopted by the Governments of Italy, Sweden, Denmark and the United States. These boats have a surface speed of 18 knots, and a speed while submerged of 11 knots.

CAST IRON IN BOILER VALVES.—From the Board of Trade Report of the explosion from a boiler stop valve chest at Pinkston Tramway Power Station, Glasgow, on November 10th, 1913, it appears the explosion was due to the long-continued action of superheated steam on the cast iron, causing disintegration and deterioration of the material of the valve chest, and it is added that a number of manufacturers have entirely ceased to use cast iron when superheat is specified, not only in land installations, but also in connection with marine work, as they do not consider it reliable. Power stations in Glasgow are now to be entirely equipped with steel mountings on boilers and steam pipes. It would seem indeed if superheating becomes common, or much higher boiler pressures are to be used in the future, that cast iron must be barred for boiler stop-valves and in ranges of steam pipes, either as junction pieces or expansion glands.

THE wreck of the troopship *Birkenhead*, which occurred between St. Simon's Bay and Algoa Bay on February 25th, 1852, is recalled to mind by the death of one of the survivors of the wreck, Captain Lucas, who passed away on May 17th at the village of Abersoch in Carnarvonshire, a few miles from Pwllheli. Lucas was an ensign in the regiment which was being conveyed to South Africa during the Kaffir War, and when all hope of saving the vessel was gone, he along with several others succeeded in swimming ashore, evading the sharks with which the bay was infested. The *Birkenhead* sailed with detachments of troops, women and children for Africa and the loss of the ship occurred in fine weather, on account of a mistake in the course, when suddenly she struck a reef and ultimately sank. The women and children were got into the boats, while the men stood by. There were 438 lives lost out of a total of soldiers and crew of about 650.

THE SHIPWRIGHTS' COMPANY.—On the 7th of May, Colonel and Alderman Sir Wm. H. Dunn presided over a Livery dinner of the Company at the Fishmongers' Hall. There was an influential gathering, the Lord Mayor and Sheriffs being the principal guests. The Master, Sir Wm. Dunn, who replied to the toast of "The Shipwrights' Company," submitted by Sir Samuel Evans, said that the opportunity still existed for the City Guilds to do an immense amount of work and he claimed that their Company was ahead of other guilds in benefiting the craft they represented. Through their efforts, during the last twenty-one years, hundreds of young men in London and other shipping centres had gained a knowledge of the science of shipbuilding and it was the intention of the Court to extend educational facilities to young men who took up shipbuilding. During the evening it was mentioned that Sir Ernest Shackleton's ship the *Endurance* would be in the Thames in June, and that an opportunity would be given to the members of the Shipwrights' Company to visit her. Sir Ernest Shackleton, who was present, spoke of his approaching journey to the South Pole.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Canadian Pacific Railway Steamships.

THE Canadian Pacific Railway's new steamships are shortening distances between the Far East and West At the beginning of the month the new liner *Empress of Asia* beat the world's record between Yokohama and Vancouver by several hours, completing her passage between the two ports in nine days, nineteen hours, her mean speed being no less than 19·19 knots. On the 11th June, her sister ship, the *Empress of Russia*, is scheduled to inaugurate a new call by these steamers at the port of Manila, thereby bringing the Philippine Islands some ten days nearer the United States than they have hitherto been. The call will be repeated monthly, and the ships of the line are to carry the United States Mails. The booked time of the voyage will be :—From Vancouver to Yokohama, ten days ; to Kobe, eleven days ; to Nagasaki, thirteen days ; and to Manila, seventeen days. Two days more take the vessel to her terminus, Hong Kong. On the return no call is made at Manila, Shanghai being substituted, but the other ports visited on the outward voyage will also be served on the homeward run. It is worthy of note that a British Corporation will now undertake to give United States possessions mail facilities far beyond anything that has ever been attained by the ships of its own flag, or, for that matter, any other. Even the Japanese, who are of such maritime importance in these waters, have never approximated such services as the Canadian Pacific now undertakes to give to Manila.

The Panama Canal.

Though landslips still continue, there are statements in the Press to the effect that some sort of service will be permitted through the new waterway soon after the 1st July, but we are not yet given any indication as to the limit of size which will be admissible, and, of course, any arrangements that are made must be subject to the possible effects of land slides. In connection with the opening of the Canal may be mentioned the discussion which has recently taken place on the subject of the frozen—or chilled—meat trade and the route *via* Panama. One has always imagined that such questions as mileage saved would govern the shipowner's decision as to whether or no he would send his ship by the old route or the new. That is to say, if he found that the amount of the toll was substantially less than the bills for coal, stores, wages and interest for the period by which it would shorten the voyage, he would be inclined to change the route, always, of course, providing that the freight market did not offer inducements to do otherwise. But now a new factor is suggested. It is said that steamers coming home to Europe from New Zealand by the old Cape Horn route cut the tropics at something very near right angles, and are, therefore, the minimum of time in warm seas, whilst they also have long stretches of cold and inhospitable weather. If they changed their itinerary and went *via* the Canal, it is said that the transit of the cold water would be shortened, whilst the equatorial conditions would be encountered over a much longer period than is now the case. The timid passenger might think that the change would tend to the general advantage. But the stern economist argues otherwise. The lower the temperature, he says, outside the ship, the less is the cost of keeping the insulated holds down to the required level. A substantial average rise in the outside conditions of temperature would, therefore, make a considerable increase in the cost of keeping the meat cargo in a marketable condition, and this is a factor which it is said will be large enough to count.

Old Atlantic Liners.

As foreshadowed in the last issue of these notes, the *Majestic* has made her last voyage—from Southampton to Preston—and she is now in the hands of the shipbreakers.

Another famous Atlantic liner made, it is said, her last sailing in her owners' service when the *Campania* started for New York with the Cunard mails at the end of April. She was then on her 250th trip. On her return, however, a few days ago, it was announced that she is not, after all, to be taken off the Atlantic station, though her port of departure and her management will be changed. She is appointed to take at least a couple of sailings to New York from Glasgow for the Anchor line, with which the Cunard Company is now so closely associated. Though, of course, Glasgow is the place of her birth, it will be an unprecedented thing—fine as the modern Anchor liners are—for a 22-knot ship to take an ocean mail sailing from the Clyde. The removal of the *Campania* from the Cunard schedule of mail sailings is, of course, due to the appearance of the *Aquitania* in the active list.

Another item of interest, and one which emphasizes the close working between the two Companies involved, is the announcement that the new 14,000-ton steamship laid down last year for the Cunard Company is to be transferred to the Anchor line. The *Transylvania*, as the vessel is named, will not need to change her designation to bring it into line with the nomenclature of her new owners. She will, indeed, probably remain in the trade for which she was designed—that between the Mediterranean and New York. The vessel is one of considerable interest in several ways, not the least because she is the first large Atlantic liner to be fitted with geared turbines.

The Mersey Dock Board

has this month been able to afford the accommodation of the Gladstone Dry Dock to the Cunard *Aquitania*, the vessel for which we are told by Mr. A. A. Booth, of the Cunard line, the dock was specially built. It will be noticed that it was ready before it was actually needed, and, no doubt, it will soon be called on to accommodate other vessels of similar size. The Mersey Dock Board is never content to rest on its laurels. It has found that its experiment in building the revetment on Taylor's bank has been such a success that it feels warranted in proposing to build a couple more training walls of the same type. These are to be situated one on each side of the Crosby Channel. The effect of these will, it is expected, be to increase the scour through that passage and so to deepen the waterway and generally improve the navigation to the entrance to the port.

The Port of Hobart,

encouraged by the advent to its regular services of the 18,000-ton White Star liner *Ceramic*, has provided a pier which will accommodate vessels even of much greater tonnage than she. It was opened at the beginning of March by the Governor of Tasmania, the *Ceramic* herself being the first vessel to make use of the facilities it provides. It only took fourteen minutes to bring her from the anchorage, where she had lain overnight, and to berth her. Her draught on this occasion was some 28 ft. 6 ins., but she might have drawn another ten feet with impunity, for where she lay at her berth there is provided some forty feet at the bows and no less than sixty feet at the stern, and this as a minimum at any state of the tide. After loading her homeward cargo, including some 53,000 cases of fruit, the *Ceramic* left, then drawing 30 ft. forward and 30—31 ft. aft. It should be added that the new berth is provided with communication with the railway system of the island, and altogether it is evident that the port offers the greatest facilities to ships of the largest modern type.

The "Kroonland,"

of the International Mercantile Marine Company, has been chartered to make a four months' trip as a floating exhibition of American goods During her engagement she is to visit the principal ports in the West Indies and on the Atlantic seaboard of Central and South America. Two-thirds of her time on the voyage will be spent in the various ports. She will run as far south as the River Plate, making Monte Video her turning point, and touching at some thirteen places on the way down. Seven calls will be made on the homeward run, of which Rio de Janeiro will be the only one previously visited. It is said that the charge to intending exhibitors will be from 2,000 to 3,000 dollars, according to space occupied, and it is thought that the venture will be an attractive and remunerative one to American business men. The *Kroonland* however, will, at all events, show the Stars and Stripes over a fine Philadelphia-built twin-screw steamer of not far short of 13,000 tons.

The Question of Piracy in Chinese Waters

is assuming alarming dimensions. At the end of April the *Tai On*, a twin-screw steamship of some 700 tons, flying the British flag, was seized by pirates, who had embarked upon

her as passengers, and who attacked the European crew when the vessel had gone several hours' journey from Hong Kong. The chief mate was killed, but the master and the chief engineer were, fortunately, saved, though the latter was wounded by his assailants. After disabling the engines and steering gear, the criminals set the ship on fire and went away with the loot which they had collected. It is estimated that though some 158 of the native passengers were saved, there was a loss of about 200 lives. The wreck of the unfortunate vessel was subsequently towed into port. It may be remembered that it is only just twelve months ago that this same steamship was the subject of a similar outrage, whilst in June, 1913, the French steamship *Lebaudy* was also attacked. More recently the Norwegian steamer *Childar*, when carrying the British mails, was the victim of a similar outrage, and at present there seems little idea on the part of the authorities as to either the apprehension of those who have committed these offences, or as to the means for preventing their recurrence. Unless the Chinese authorities bestir themselves and take measures for the prevention and punishment of piracy committed by their subjects, there seems little opportunity of European Powers being able to stop these outrages, as the criminals always get away into Chinese territory.

The Report of the Experts,

who were appointed by the United States Government to enquire into the circumstances of the loss of the oil-tanker *Oklahoma*, has now been made public in detail. Though the observations of the inspectors themselves are in some cases not very valuable, the facts that are disclosed in the report may be usefully considered by those who are charged with the management and navigation of tankers and, indeed, of water-ballasted ships generally. The vessel, it seems, put to sea at 1 p.m. on the 3rd January in a heavy gale. She was in ballast, and, according to what appears to be a custom under such circumstances, at all events amongst American navigators, the arrangement was roughly to have alternate ballast tanks full for ballasting purposes. The weather did not improve, and after she had been about twelve hours at sea the work of filling other tanks was commenced. An hour later, according to the evidence of the boatswain, he was awakened by a shock and a commotion as though the ship had been struck by an unusually heavy sea, the vessel seeming to stop and shake herself. One would imagine that what would wake an old sailor on the night after sailing must have been something unusual. And, indeed, it was. It was probably the commencement of the break-up of the hull. At 7-30 a.m. that morning, it was noticed that the deck plating was buckling just before No. 5 hatch. Now No. 5 was one of the tanks which had been empty when the ship sailed, and which had been filled at sea. A little later it was noticed that this tank was no longer full—the water in it was level with the sea only. At 9 a.m. there was a terrific crash, the vessel broke in two, and the bow swung round to starboard, floating for a time parallel to the after part. It would appear from all this that the catastrophe was not really so instant as one had gathered from the reports issued at the time of the loss. There was probably a warning—and one clear enough to wake the boatswain—some eight hours before the final disruption. But no one appreciated it, and they went on filling up the tanks, and so putting undue strains upon the fabric of the vessel till she could stand it no longer. The probability, of course, is that the free water, admitted to commence the filling of No. 5 tank, lashed about the empty space into which it was admitted with great force in the heavy sea which undoubtedly was running at the time. The effect of free water under such conditions is tremendous, and no doubt the rivets in the skin of the ship soon began to give way, hence the leakage and the partial emptying of the tank at a later hour in the morning. As the water-level went down the lashing of the contents of the tank re-commenced, and, eventually, not only riveting, but plating itself gave way, with the result which is now so well known. The obvious lesson of the disaster is to emphasize the immense danger attending the practice of filling (or emptying) ballast tanks at sea, especially when there is a sea running.

The Atlantic Conference

met as arranged at Cologne, and after very brief consultations dispersed for another couple of months. It will re-assemble again probably in London. Meanwhile the originators of the disagreement have made up their differences, and have become fast allies, even if they have not for many purposes united their forces. Herr Ballin and Herr Heinecken have buried the hatchet; the cut Atlantic fares have been restored; and there is talk of a "community of interests" in certain of the more important trades between the Hamburg-American line and the Nord Deutscher Lloyd.

The "Vaterland" and the "Aquitania"

have both come into their stations, and it is to be seen what measure of success will attend the various new luxuries and safety appliances, which have been introduced by the rival managers as the outcome of their long experience of the wants of passengers and the possibilities of providing additional measures for safety at sea.

Wireless and its Uses.

Early in the month of May, the contents bills of the evening papers announced the peril of a big American passenger steamship in the Pacific ocean. This was the 11,000-ton *Siberia*, on her trans-Pacific voyage. It was reported that she was in dire distress and was sending out S.O.S. signals. Fortunately the next news set anxiety at rest. She was reported as arrived at Manila without any accident and without having sent off any signal of distress. Satisfaction at her safety was, of course, expressed. But premiums for re-insurance had been run to about 50 guineas, and arrangements had been made for the despatch of salvage vessels to her presumed place of stranding. Various theories as to how the reports arose have been put forward, but at present there is nothing definite. A feeling, however, prevailed that such cases would tend to undo the value of wireless in cases of disaster, since people would be apt to think that urgent calls might be bogus, and so would take no notice of them; but a couple of days after the *Siberia* affair, wireless calls of S.O.S. were reported in the Atlantic, and they proved to be only too well grounded. The Leyland liner *Columbian*, when some 800 miles east of Sable Island on her westward voyage from Antwerp towards New York, broke into flames. A wireless call was sent off and almost immediately a great explosion ripped up her decks and destroyed the installation. Three boats were launched, and soon the Cunarder *Franconia* was on the scene and picked up one of them. Another was found by the steamship *Manhattan*, but the third was missing, whilst several of the survivors are seriously burned and three are dead. One was killed on board, another was lost whilst taking to the boats, and a third, having sustained terrible injuries during the fire, died in the boat before it was picked up by the *Franconia*. The tragedy of the third boat was one of the most horrible of recent sea-stories. She left the *Columbian* with fifteen men. Fourteen days later she was picked up by the United States revenue cutter *Seneca*. Only four of the fifteen were alive and their state was terrible. Of the others there was a sad monotony in the tale. Disappointment at seeing passing steamships which failed to notice their signals, hunger, thirst, drinking sea water, madness, delirium and death. It seems strange to think that such an experience could be possible in these days when people talk of the crowded "lanes" of the North Atlantic. The cause of this disaster is presumed to be spontaneous combustion in the rags which formed part of the ill-fated liner's cargo.

MESSRS. James Brown & Son, of Glasgow, have recently issued a companion picture to their "Lee Fore-Brace." The new picture is called "Wet Work in the Waist," and is finely reproduced in collotype. The size is 20 in. by 25 in., and the cost 2/6. The original picture has been prepared by Mr. Oswald F. Pennington.

ON May 9th, at the annual meeting of the South Wales Branch of the Association of Mining Electrical Engineers, Mr. Sydney F. Walker, R.N., was presented with a testimonial, in the shape of a handsome gold watch, by the members of the branch, "as a token of their esteem and respect," in connection with his Presidency for the four first years of the existence of the Association, the watch being suitably engraved to this effect. The presentation was made by the President of the branch, Mr Godfrey Williams, of Aber Pergwm, a large colliery owner in Glamorganshire.

SUBMARINE SIGNALLING.

(*Continued from page* 387.)

MECHANISM FOR BELL BUOYS.

There are many places, as marine engineers are well aware, where the fairway for instance is marked by buoys, and it is of great importance that in foggy weather these buoys should possess the means of automatically signalling their presence. There are also places where it is important to give warning to approaching ships, say on the edges of shoals and elsewhere, where it is sometimes difficult to arrange a lightship, or an electrically operated bell. To meet these cases, the bell buoy has been worked out by the engineers of the Submarine Signal Company. The same bell is used as with the compressed air and electrically operated apparatus; but as will easily be understood, the striking of the bell has to be accomplished by the aid of the waves themselves. The whole apparatus consists first of a float buoy of some kind or other. A special kind of float buoy has been worked out, as shown in Fig. 6. As will be seen, there is a light superstructure above the actual buoy, the latter being cylindrical in form, and being made strong enough to stand the force of the waves. The buoy itself is moored to the bottom, by the usual mooring chain and mushroom anchor; and it will be easily understood that it is of importance to keep the operating mechanism free of the mooring chain. To the lower side of the buoy is attached a rigid framework, about 18 feet in height. As the buoy floats in the water this framework stands vertical, when the buoy is at rest or at varying angles, according as the buoy is lifted by the force of the waves. To the lower part of this framework is attached a hollow case, also made very strong and open at the top and bottom, and inside of this case is another watertight case, in which the mechanism for ringing the bell is carried. The watertight case is suspended in the middle of the protecting receptacle, and as usual the bell hangs below the case containing the mechanism. The case is of bronze and made in parts, so that it can be taken adrift for repairs. To the outside of the case containing the operating mechanism is attached a fan or vane. The office of the fan is to receive the rise and fall of the waves, and to transmit the power delivered to it by the waves, to a spring on the inside of the case containing the operating mechanism. As the buoy rises and falls in obedience to the action of the waves so the fan or vane falls and rises; and by the aid of a system of levers, and spur and pinion wheels, on the inside of the case containing the operating mechanism, it gradually winds up a spring. The power is transmitted through a crank shaft; and it is so arranged that when the spring is fully compressed the crank is just about to go over its centre.

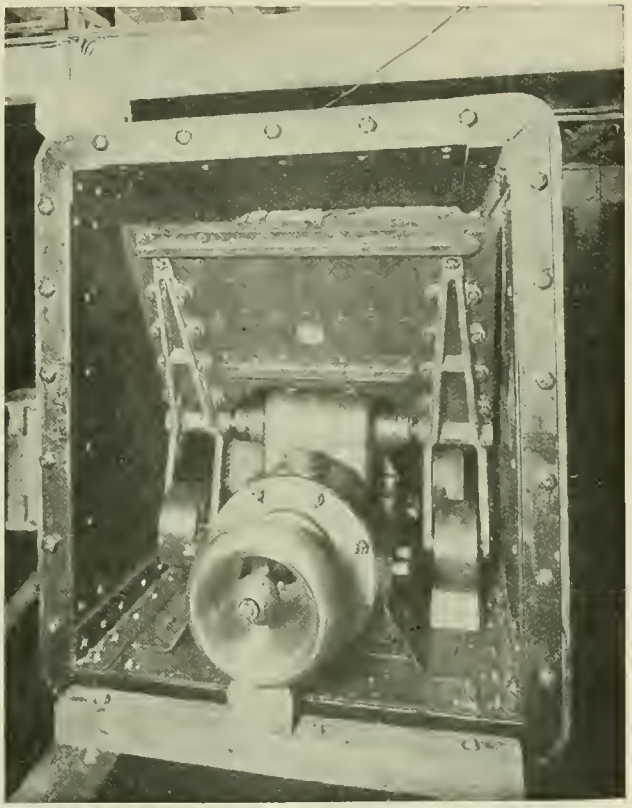


Fig 6A —Mechanism for striking bell of bell buoy by the force of the waves.

The next motion of the waves drives it over its centre, the spring comes into operation, and by the aid of another system of levers the hammer is made to strike a smart blow upon the bell. It will be understood that the energy of successive waves is stored in the spring by the aid of the fan or vane and the system of wheels. It has been found by careful experiment that when the sea is apparently absolutely calm there is sufficient motion to ring the bell several times a minute; and this would correspond to the cases so familiar to seamen, where there is a fog and a calm at the same time. In an ordinary sea the bell rings about fifteen times a minute; and the greater the amount of motion in the waves, the heavier the sea, the more rapidly is the bell struck. The whole apparatus weighs about 6,000 lbs., and from top to bottom measures 27 feet; and the greatest diameter is 8 feet 6 in. A considerable number of these bells are in use in different parts of the world. Figs. 6a and 6b show the mechanism of the bell buoy, by which the motion of the waves is employed to strike the bells, and Fig. 6c shows a bell buoy, with one of the apparatus described, fitted by the Submarine Signal Co. at Tarifa in the Straits of Gibraltar.

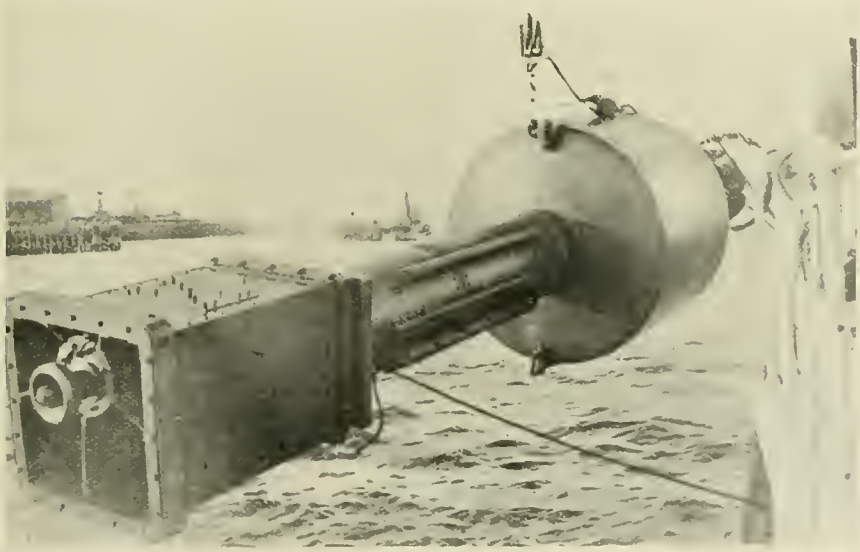


Fig. 6.—Complete Bell Buoy, with bell ready for lowering into place.

BELLS FOR USE IN CONNECTION WITH PIER HEADS.

There is another class of cases where the use of a bell would be of great service, *viz.*, the neighbourhood of landing piers. Most of us remember cases where we have been approaching a pier and suddenly a fog has descended, and

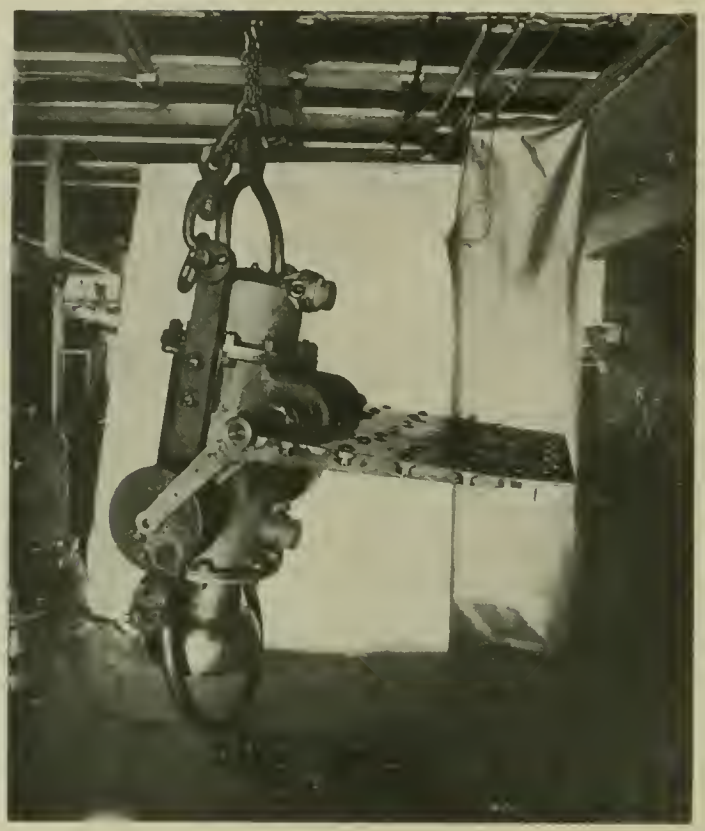


Fig. 6B.—Latest form of mechanism introduced by The Sul marine Signal Company for striking the bell of a bell buoy by the force of the waves.

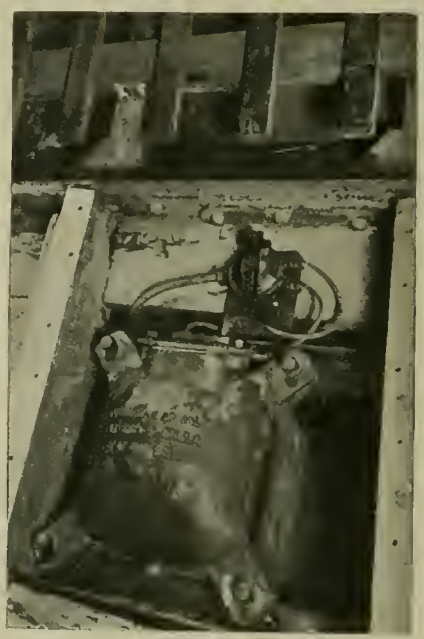


Fig. 7.—Microphone in its case used to receive sound signals.

though a syren on the pier has been sounding very loudly none of the sound has reached the steamer we were in. A bell under water at a little distance from the pier, but operated from the pier, would be of great service. To meet this requirement an apparatus has been worked out, by means of which a bell is carried as far out from the pier as possible, and submerged to as great a depth as possible, and is worked by a hand rope from the pier itself, by means of a system of levers, within the case as usual containing the operating mechanism, and carried above the bell.

The Receiver Apparatus Attached to Ships.

The most difficult part of the problem involved in submarine signalling by sound was the working out of the receiving apparatus. The microphone, which has so long now been used for speaking, naturally suggested itself as the apparatus that would answer the purpose, if it could be satisfactorily arranged. Again there is the problem of protecting the microphone, which is a very delicate apparatus, from the action of the waves and from sea water. As mentioned above, sea water is a great enemy to all electrical connections, to all cases where copper wires have to be held under brass screws, etc. At first the microphone was placed outside the ship, but for various reasons this arrangement was found to be impracticable. Now it is placed in a tank, filled with salt water, inside the skin of the ship. Fig. 7 is a view of one of the tanks. There is a similar tank on each side of the ship, so that the sound waves are received on each side, and there are two microphones suspended in about the middle of each tank. In the chart house, the wheel house, or somewhere conveniently for the officer of the watch, is fixed a switch box, shown in Fig. 7a. A battery of dry cells is also connected to the apparatus. The switch box carries two crutches supporting two telephone receivers; and these can be connected, through a switch, to any of the microphones. An indicator, in front of the switch box, shows the officer of the watch which microphone the telephones are connected to. He places the two telephones, one to each ear, and listens in the usual way, as shown in Fig. 7b. By switching first on to, say, the starboard microphone and then on to the port microphone, he is able to judge on which side of the ship the bell that is

Fig. 6C.—Submarine bell buoy, fixed by the The Submarine Signal Company at Tarifa, in the Straits of Gibraltar

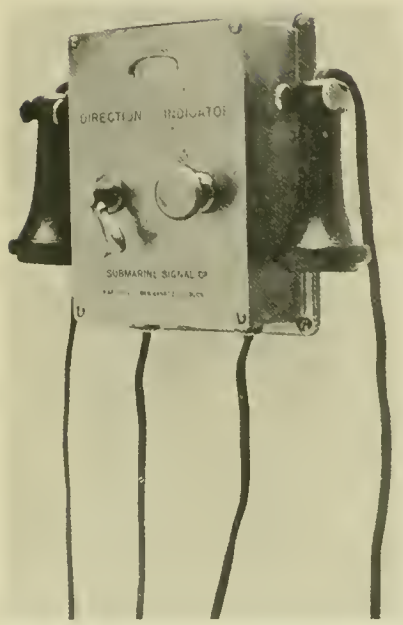


Fig. 7A.—Telephone Switch Box fixed in Chart House to receive signals from Microphone.

Fig. 7B.—Officer of the Watch in Chart House listening for sound of submarine bell.

giving the signal is. The larger volume of sound will naturally come from the side on which the bell is; and if it is well on that side, it may easily happen, that no sound is heard in the microphone on the other side. The officer of the watch alternately switches on the port and starboard microphone, judging carefully by the volume of sound, as to the position of the bell; and to make sure it is usual to turn the ship's head toward the source of sound. It will be obvious that if the volume of sound in the telephones, when switched on to either the port or starboard microphone, is the same, the ship will be head on to the source of sound.

The sound in a microphone is interfered with to a certain extent by that made by the water in rushing past the ship's side, and therefore the slower the ship is moving the greater is the distance at which the sound is heard. Ships making the land at some important point, therefore, do wisely to slow down and listen carefully for the bell, as they are more likely to pick it up when going slowly than the reverse. Also, the deeper the draught of the ship, and the lower down the tanks containing the microphones can be placed, the greater is the distance at which the sound of the bell will be heard. It will also be easily understood that there is a certain place between the stem and right abeam where the sound is received most clearly on that side. This can only be found by actual experiment. In the case of ships with fine lines and with sharp bows, the microphone tanks will be placed fairly well abeam, while with ships having bluff bows they can be placed well forward. The sound is received by the microphone best right forward; but the distinction between port and starboard being important the tanks are pushed aft, until the distinction is made quite clear. The way in which the microphone picks up the bell sound if it is moved farther and farther aft, may be of interest. Assuming the bell to be well on either bow, the sound will be received by a microphone with greater and greater volume, as it is moved farther and farther aft, until a certain critical point, usually a little before the beam. After this critical point is passed the sound received becomes less and less, as the microphone is moved aft; and finally when right astern the sound is almost and often quite inaudible. Fig. 8 shows diagrammatically how a ship may tell the exact bearing of a bell by swinging her head round. In the first diagram the bell is supposed to be about six points on the starboard bow; the sound will be loud when the telephones are connected to

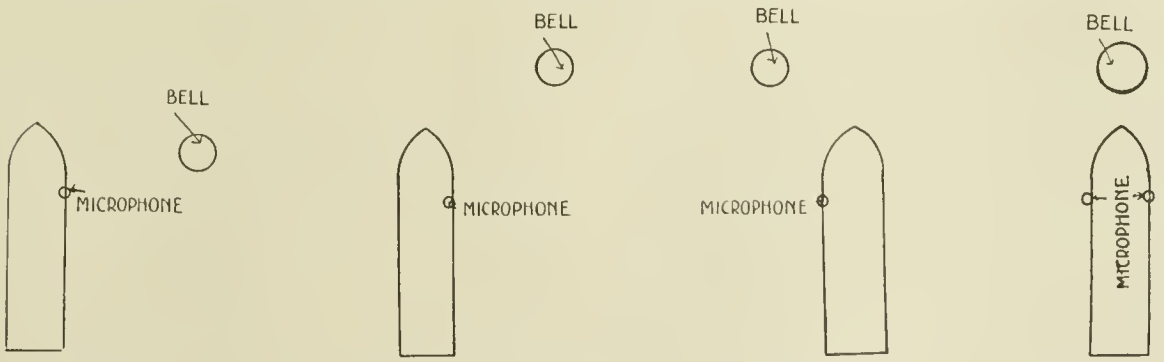


Fig. 8.

(*a*) Bell broad on starboard bow.

(*b*) Bell a few points on starboard bow.

(*c*) Bell slightly on port bow.

(*d*) Ship's head pointing direct to bell.

Fig. 9.—Emergency Submarine Bell used by ships in distress.

the starboard microphone, and almost inaudible when connected to the port microphone.

In the second diagram the ship has been swung round, until the bell is about two points on the starboard bow. The volume of sound will still be much greater on the starboard side than on the port side, but there will be very much less difference than with the first diagram, the bell being heard fairly well on the port side. In the third diagram the ship's head is supposed to have been swung round, until the bell is about two points on the port bow. The greatest volume of sound will now be in the port microphone, and there should be about the same difference between it and the starboard microphone as in the previous diagram, but with the port microphone having the larger volume of sound. In the fourth diagram the ship's head is supposed to point direct to the bell, and the volume of sound will be the same in each case.

A Suggested Use of Submarine Bell Signals Between Passing Ships.

It has occurred to the writer that the use of the submarine bell signal might be extended to enable ships to warn each other of their approach, and also to enable them to navigate in case of fog just as easily as they now do by night by the aid of light.

The writer understands that what is termed emergency submarine bell apparatus is being supplied to a certain number of ships, the object being in case of a ship meeting with an accident, say, catching on fire, striking a rock, or requiring assistance, she would first signal for assistance by wireless telegraphy, and then set her emergency bell going, to guide any ships that were coming to her assistance, directly to her. This is shown in Fig. 9. The emergency bell must, of course, be quite distinct from any lighthouse or lightship bell, but that is not a difficult matter. It will be remembered that while wireless telegraphy signals furnish the information that a certain ship is in distress, unless the latitude and longitude are given, or some other means for denoting her exact position, no passing ship can tell in what direction the ship requiring assistance lies. A very skilful wireless telegraph operator may judge by the strength of the signals he gets, when the ship goes first in one direction and then in another, but the use of the submarine signal once the range of fifteen miles or so has been entered, enables relieving ships to make directly for the ship requiring assistance, and so to save very valuable time.

It appears to the writer, also, that if a second source of sound can be found, that can be operated under water, in the same manner as the bell is, and if these two sources of sound are placed one on each side of the ship, just as the green and red lights are, it should be possible for ships to know the position of crossing ships, or of overtaking ships, just as they now do by the aid of ships' lights. He understands that experiments are being made by the Submarine Signal Company, with a view of carrying out some arrangement of this kind. The second source of sound must of course be perfectly distinct from the bell. The syren, if it can be worked under the conditions, or some form of whistle, is apparently what is required. The difficulty is, of course, to place these apparatus under water, particularly under the conditions ruling, with the ship to which they are attached going rapidly through the water. The writer suggests that probably the final solution will be something on the lines of that which has been adopted for the microphone. The sources of sound will be inboard and will be arranged to deliver their sound outboard, one on the starboard side and one on the port side, to the water that is rushing past the ship. A difficulty, of course, arises here; the water which is rushing past the ship will conduct the sound astern, but not so easily outwards, to port and starboard. Considerable experiments would have to be made to enable the idea to be carried out. Assuming, however, that a ship has a bell say on the starboard side and a whistle on the port side; Figs. 10 *et seq.* are diagrams, adapting to the suggested system of sound signals the well-known rules governing the passing of ships at night, as indicated by their lights. In Fig. 10, a ship hears a whistle on her starboard bow; she knows that it comes from a ship crossing from starboard to port, she also knows it is her duty to keep out of the way and further, that to enable her to do so, she must put her helm to port. It will be noticed that this corresponds to the case of a ship at night seeing a red light on her starboard bow. In Fig. 11 a ship hears a bell on her port bow, and she knows that it comes from a ship crossing her bows from port to starboard. She knows also that it is the duty of the other ship to keep out of the way.

There is the case of the sailing ship. Steamships are obliged to keep out of the way of sailing ships, and the white light at the mast head is the indication of the steamship. Probably by the time such a system of submarine signals is established the sailing ship will have completely gone out, with the exception of a few coasting vessels, and special precautions could be taken in waters where coasting vessels

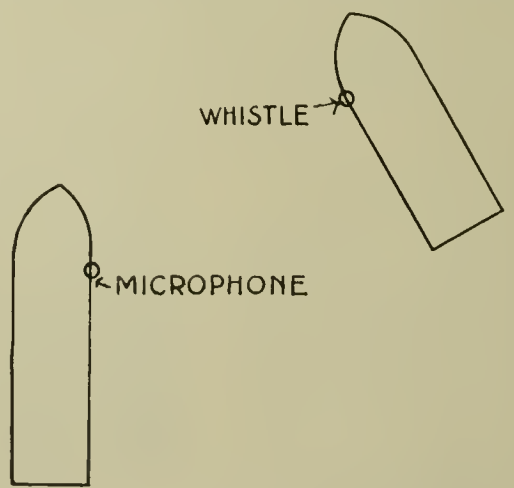


Fig 10.—Ship crossing from starboard to port. Whistle heard in starboard microphone.

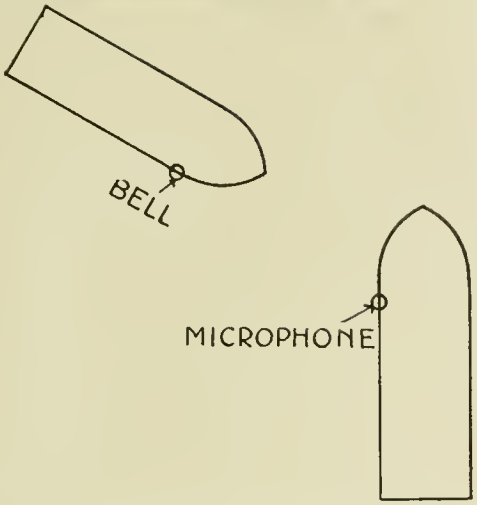


Fig. 11.—Vessel crossing from port to starboard. Bell heard in port microphone.

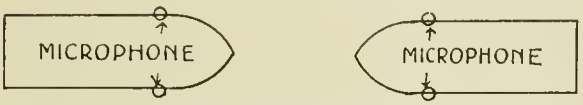


Fig. 12.—Two ships meeting end on, both whistle and bell heard in both microphones in each ship

are met with. In Fig. 12, two ships are supposed to be approaching each other head on, each will hear both the bell and the whistle of the other, each will put its helm to port, each will know that the other has put its helm to port, by the fact that the whistle of each will increase in sound, while the bell decreases in sound.

(*Concluded*).

DIESEL ENGINES FOR MARINE PURPOSES.*

Continued from page 393.

It might be thought to be possible to further increase the thermal efficiency by carrying the expansion further. Certainly it does seem to be extremely wasteful to exhaust the gases while they are at a considerable pressure, and also while they are at a very high temperature. Attempts have been made to utilize their high temperature for steam raising, but these have not been so successful as was anticipated. With regard to the possibilities in the direction of further expansion, it must be remembered that greater expansion necessarily means larger cylinders, which will increase the loads on the mechanism in far greater proportion than the increase of work which will result. Besides this, the larger cylinders will possess larger heat abstracting surfaces, and in view of the large proportion of the heat which is lost by the cooling water, it is easy to see that there must be a point at which any gain due to greater expansion will be accompanied by an equal loss by extra heat rejected in the cooling water. That the present practice is not far from that point is seen from the fact that the actual thermal efficiency of the engine is not much affected through a long range of power, produced by what is virtually a variation of expansion, extending from, say, 15 or 20 per cent. overload, down to about two-thirds power in many land engines, and Professor Junkers' experiments, already quoted, show the same result.

An important point which deserves consideration is the amount of heat carried away by the cooling water. There are two distinct conditions dominating this. First, the materials of the cylinder barrel, cover, and piston must be kept sufficiently cool throughout their thickness to ensure that the temperature at no point rises so much that the strength of the material becomes unduly depreciated, and also, and this is equally important, the temperature gradient through the thickness of the metal, that is to say, the difference of the temperature of contiguous parts of the metal must not be so great that the consequent differences of expansion would cause abnormal stresses in the metal, altogether independently of the stresses due to the pressures in the cylinder.

As illustrations, take the simple cases of a plain cylindrical barrel, such as the actual cylinder liner of a Diesel engine and of a circular furnace of a steam boiler. Both are subjected to intense heat on the inside, and both have water in contact with them on the outside. One, however, is comparatively thick and the other comparatively thin. In both cases the particles of metal forming the inner surfaces of the cylinders must be much colder than the gases in contact with them on the one side, but they must be hotter than the particles of metal next to them. Similarly the particles next the outer sides must be hotter than the water which wets them, but colder than the metallic particles adjoining them. The difference of the temperatures of the two sides of the material will depend upon the conductivity of the metal which determines the rate at which heat will flow through it. It is evident that the thicker the metal the greater will be the difference of temperature of the two sides. In a boiler furnace the material is steel, which can be relied upon as being continuous throughout the thickness, that is, it will not contain any laminations or small local defects of continuity which will impede the flow of heat through it; whilst, in cast iron of which the cylinder liner, cover, and piston are generally made, there are always innumerable particles of graphite imbedded in the metal, and these must more or less impede the flow of heat, so that with the same thickness of material and the same temperature conditions outside the two sides of it, there must always be more difference of temperature of the two sides in the case of cast iron than would exist in the case of steel plate. In a furnace in which oil fuel is burned, it is common experience that a thickness of $\frac{3}{4}$ in. will withstand continuous working, if it is kept scrupulously clean on the water side, and it is generally felt that it would be unwise to exceed that thickness. In a Diesel engine the thickness of cast iron cylinder liners, piston crowns, etc., owing to considerations of strength, must be made considerably in excess of this; in fact, thicknesses greater than 2 in. have been successfully used. Now, the temperature in the furnace burning oil fuel and the maximum temperature in a Diesel engine cylinder cannot be very different. The reason the thick cast-iron metal withstands the temperature is because the latter is intermittent, not continuous. The actual temperature of the skin of the metal must depend more upon the mean of the temperature taken on a time basis than upon the maximum. This is one great argument frequently quoted in favour of the four-cycle engine as against the two-cycle. As will be seen from the temperature calculations given in the Appendix, the mean temperature in the former is considerably less than that in the latter, and it is quite conceivable that a much less difference might put one below and the other well above the critical temperature which would give trouble.

If now, say, in the cylinder barrel, the inner layer is raised in temperature more than the outer layer, as, of course, it must be, it will tend to expand more, and the difference in the expansion can only be accommodated by the inner layers being compressed and the outer layers being put into tension, which tension will be superimposed upon that which the liner has to bear on account of the pressure in the cylinder. It is thus quite conceivable that a thick cylinder exposed to high temperature, as well as to a high pressure inside it, will be actually more stressed than a thinner one. The same reasoning applies to the piston crown and the bottom of the cylinder covers. The metal in these parts is put into a state of compression by reason of the high temperature, besides being subject to a similar stress due to the pressure. These considerations show the great importance of keeping the thicknesses of the metal at parts exposed to great heat as thin as possible, consistent with their possessing sufficient strength. It is these considerations which lead to the impression that only comparatively small cylinders will be possible with Diesel engines.

On this point experience will be the only safe guide. Laboratory tests, although very useful, cannot reproduce

* Abstracts from a paper by Mr. J. T. Milton, read at the Springs Meetings of the 55th Session of the Institution of Naval Architects, April 2nd, 1914.

the strenuous conditions incidental to constant use involving rapid variations of conditions repeated many millions of times. It, of course, does not follow that an enlargement of cylinder diameter necessarily involves a proportionate thickening of metal throughout. As an instance, it might be mentioned that in some of Messrs. Burmeister & Wain's engines larger pistons have been made with less thickness of metal than was successfully used in the *Selandia*. This has been rendered possible by a modification of the design, and it is not to be supposed that no further progress can be made in this direction.

Another point which it has been thought will present difficulty is the fact that cast iron will appreciably change form and dimensions through continuous high temperatures and so cause troubles similar to those which have occasionally been experienced in large steam engines. It was probably fear of the growth of cast iron under these severe heat conditions which led to the use of cast steel for cylinder covers. Most Diesel engine manufacturers have reverted to the use of cast iron for covers. Some of them give the metal a severe heat treatment before the completion of the machining operations. It is quite possible, however, that cast steel will be again used for these parts. There have been several cases of cracks in cast-iron cylinder covers in positions where, irrespective of the expansion by heat, the pressure on the parts puts the material into compression. In some cases these cracks have been allowed to remain, and as they have not extended when in use, it has been considered that they were due to heat stresses only. In some cases saw-cuts have been initially put into similar positions of the covers, and these cuts have prevented subsequent cracking.

From the Appendix giving the work done by each of the Diesel-engined ships it will be seen that greater troubles have, in general, been caused by the air compressors and their accessories than by the Diesel engines themselves. It must be frankly stated that this was not expected. Machines compressing air up to as great or even greater pressures than are required with Diesel engines have been in use in warships for very many years, and it was anticipated that compression would not present a difficult problem. If there have been special troubles in war vessels with air compressors, they have not become public property. Much, if not most, of the trouble, has been due directly or indirectly to the lubrication with the compressors of Diesel engines.

Attention was specially drawn to this point by the sad accident which occurred to the *Suecia*, a Swedish vessel, on her second voyage. This vessel was built and engined by Messrs. Burmeister & Wain, and has similar engines and auxiliaries to those of the *Selandia*, although they are rather smaller. When off the coast of Brazil one of her high pressure air receivers burst. The vessel put into Rio, where the machinery was temporarily repaired, and she completed her voyage to Stockholm, where an official enquiry into the accident was held. The arrangement in this vessel is that the air used for starting, as well as for fuel injection, is first compressed by a two-stage compressor, worked by an auxiliary Diesel engine, up to 20 atmospheres, and is stored at that pressure in large cylindrical receivers. The air used for fuel injection is taken from these receivers and further compressed by a high-pressure compressor worked by each main engine to 70 atmospheres, and this high-pressure air, after passing through coolers, is stored in small steel receivers, passing from them as required for injection purposes. The receivers are fitted with drains for clearing them from the water which always separates from compressed air. It had become evident during the voyage that an abnormal quantity of lubricating oil was passing through the compressor, as much oil was blown out through the drain along with the separated water. It had also been found during the voyage that the cooler pipes through which the air has to pass had on more than one occasion become partially choked with greasy matter. They had been cleared by disconnecting them, making them red hot, and so burning out the grease from them, and then blowing out the residue by means of compressed air. An examination of the damage after the accident showed that an explosion first occurred in the pipe leading from the air cooler to the high-pressure receiver, this pipe being burst in two places. The flame then passed the valve connecting the pipe to the receiver, melting a groove in it, and entered the receiver, which in its turn burst. The engine room after the accident was filled with smoke, showing that oil combustion had occurred, and that the accident had not been due merely to over-pressure caused by pumping too much air into the receiver.

When air is compressed its temperature rises, the rise of temperature becoming greater as the compression increases. In the Diesel engine cylinders, in which air compression to 35 atmospheres takes place in one stage, the temperature becomes so much raised that combustion of the oil fuel takes place immediately it is sprayed into the cylinder. In the air compressors the work is done in two or more stages, the air being cooled after each stage, so that, although the final pressure is higher than it is in the working cylinders of the engines, under proper working conditions a very high temperature is not at any time reached. It is stated that, under normal conditions, the air temperature on leaving the compressor was about 100° C. (212° F.), and that after passing through the cooling coil this was reduced to 40° C. (104° F.). When, however, the cooling coil became partially obstructed with oily deposits, a higher pressure had to be obtained in the compressor in order to force the air past the obstruction, and in these circumstances the air would occasionally attain a temperature of 300° to 400° C. (572° to 752° F.) before being cooled and 60° C. (140° F.) after cooling. On the vessel's arrival at Stockholm when the cover to the air compressor of the starboard engine was removed, a quantity of black carbonaceous matter was found on and in the vicinity of the valve and in the air channels. In the port compressor the quantity was comparatively small and the surfaces of these parts were more oily and clean.

The explanation of the accident appears to be as follows :—

The lubricating oil used is a hydrocarbon oil of high flash point. The compressor passes a considerable quantity of this oil into the compressed air. Some particles become deposited upon the surfaces of the valve, valve chest, cooling spiral and pipe connecting the cooler with the air receiver. These particles become partially dried by evaporation of their lighter constituents in the hot and dense air passing over them, the residue forming the tough and sticky composition which was found on these surfaces. When the temperature of the air is exceptionally high this sticky composition becomes carbonized, or cracked, and partially transformed into carbon. In ordinary circumstances the particles of oil which do not become deposited on the above-mentioned surfaces are carried by the air current into the receiver, either as vapour or in the form of "oil fog," which, consisting of oil intimately mixed with air, forms an explosive mixture. When the cooling coil becomes much obstructed, so as to cause the temperature of the air to rise considerably, as above mentioned, the deposit in the pipe becomes spontaneously ignited and the heat so generated may ignite the "oil fog" in the receiver, causing an explosion there.

It had not previously been generally realized that there was a considerable difference in the behaviour of oil in highly compressed air from that of oil in air at ordinary atmospheric pressure at the same temperature, although it was known that it was dangerous to have oil in contact with highly compressed oxygen. In July, 1912, a serious explosion occurred at the Electric Station at Bray, Ireland. A report, made by Mr. G. S. Taylor, H.M. Inspector of Factories, of the Home Office, has recently been published, giving particulars of the accident and the cause of the explosion.*

In this report it is stated that many explosions and failures of receivers connected with air-compressing plants have been recorded in the past, which have been traced to the presence of lubricating oil in the receivers, and that similar explosions have also occurred in the pipes and air vessels of Diesel engines. At Barrow, in 1911, an explosion occurred in a compressed air receiver pipe. The explosion was attributed to vapour of the lubricating oil forming an explosive mixture with the compressed air. In several other cases the explosions have occurred in the high-pressure delivery pipe near the compressor. Generally the pipes had been subjected to high temperature and contained carbonaceous deposits. It is mentioned that there is always a possibility of ignition of the oily deposits in the blast vessel by a "back fire" from the cylinder into the valve casing and blast pipe, that such a case is known to have occurred in a marine Diesel engine, in which the blast pipe was burst for a length

* Reported in *The Marine Engineer and Naval Architect*, December, 1913.

of 20 ft. Mr. Taylor recommends that only mineral oil with a very high flash point should be used for lubricating air compressors, and that it is advisable to provide special oil separators between the compressors and blast vessels. He points out that only rarely are means provided for cleaning or examining the interior of air vessels after a period of use, and that it is considered by some engineers that the oily deposit which accumulates in the interior is an advantage, as it acts as an anti-corrosive and so preserves the metal; and he recommends that air vessels should be cleaned and examined periodically, say, at least every twelve months. Besides the cases quoted by Mr. Taylor, the following are of interest. At one works the high-pressure air pipes are now always made of copper. They were formerly made of steel, but several accidents occurred, pieces of metal being burst out of the pipes. This was attributed to the steel pipes not possessing sufficient ductility, and so copper is now used, and with this metal no such casualties have occurred. In the light of recent experience it is probable that the bursts were due to oil ignitions and not to faulty material of the pipes.

In the case of an experimental Diesel engine an explosion of a steel high-pressure air pipe has occurred.

At another works several cases have occurred of bursts in high-pressure air pipes. These always happened in the pipes conveying the hot compressed air to the cooler, none having occurred in the pipes leading from the cooler to the storage receivers. These accidents have led the firm to place the coolers close to the compressor so as to minimise the dangerous portion of pipe. In these cases copper has always been the material used for the pipes. Another firm stated that burstings have occurred, in their experience, in pipes conveying hot air from the compressor to the coolers, and that there have been quite as many accidents of this kind to pipes attached to the low-pressure and to the intermediate-pressure stages of compression as to those connected with the high-pressure stage.

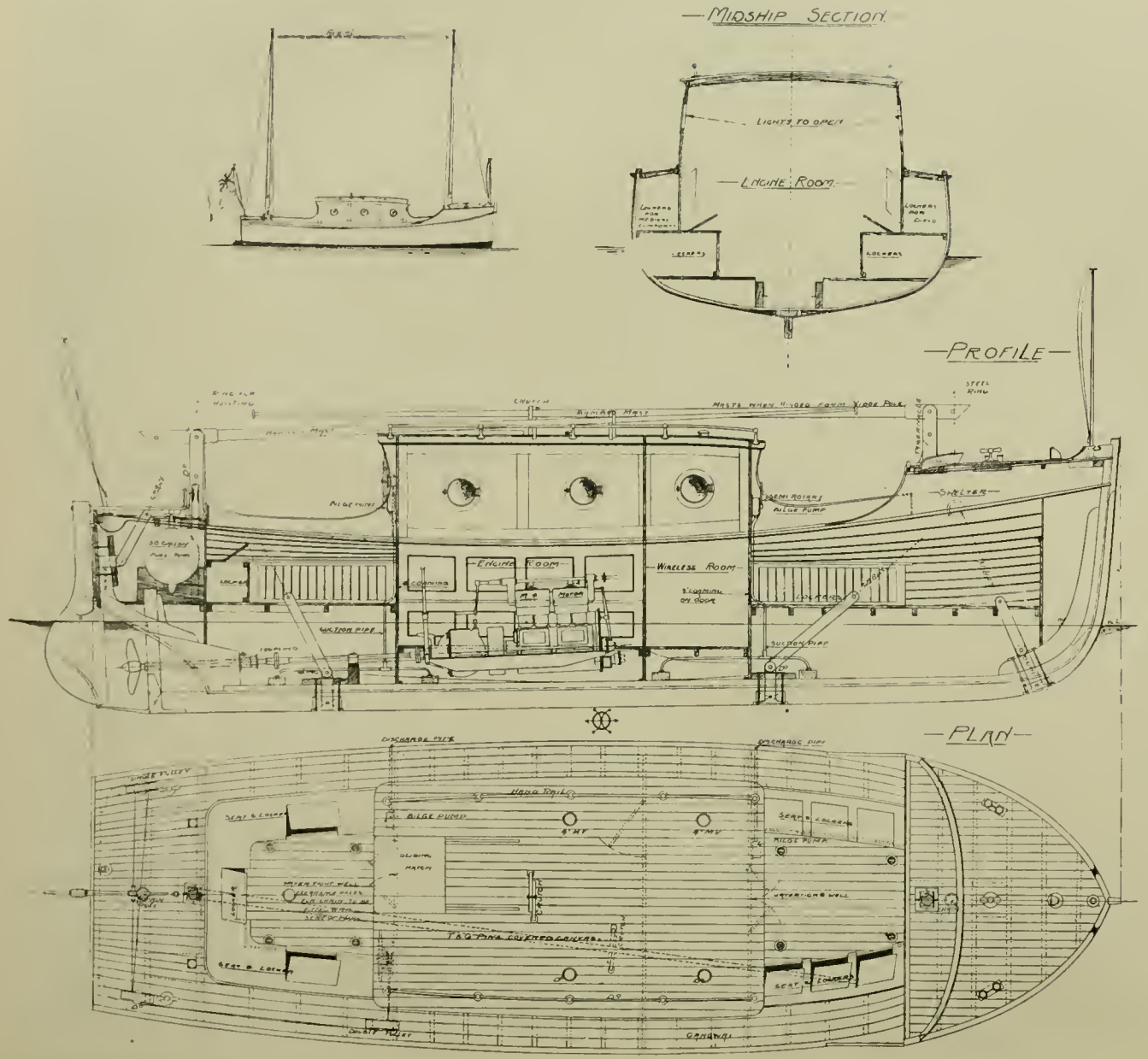
An accident through combustion within an air compressor was discussed in a contribution from Mr. A. R. Ledoux, of New York, to the Transactions of the American Institution of Mining Engineers, in February, 1903, and was referred to in Mr. Taylor's report. In this case the air compressor was a single stage, compressing to 80 lbs. per square inch, and was being used for driving some mining machinery in one place and for ventilation in another part of the workings. There was no explosion, but the accumulated oil and carbon deposit in the delivery pipe took fire, made the pipe red hot, and the products of the combustion being delivered instead of pure air led to the death of two of the workmen. In the discussion which followed it was pointed out that the air in the cylinder at the commencement of the stroke comes from three sources, *viz.*:—(1) The air left in the clearance space on the previous stroke; (2) that which leaks back either past the discharge valves or past the piston; and (3) the fresh air drawn in from the atmosphere. As regards (1), this is at first heated by the compression, but by expanding back to the atmospheric pressure it does work and adiabatically loses its temperature. As regards (2), however, as it expands back from the discharge pressure to the intake pressure without doing work, it maintains the temperature it had attained on discharge. The effect of this is that leakage increases the initial temperature of the charge to be compressed, and with it the temperature at which the air will be discharged at the end of the compression. A calculation is made showing that a 5 per cent. leak in the case of the compressor in use would increase the temperature by 39° and a 10 per cent. leak by 85°, and it is pointed out also that in general a leak is a constant quantity, so that when slowing down a compressor the proportionate leakage, upon which the rise of temperature depends, becomes greater. Besides the effect of leakage, either past the piston or past the valves of the compressor, there are other causes which lead to the compressed air having higher temperatures than necessary. If the valve passages are restricted the pressure will be considerably raised in forcing the air through them. The increased pressure will be accompanied by increase of temperature, and, as in the case of the air leakage referred to, the fall of pressure when the restrictions have been passed will not cause a lessening of the temperature. Another cause has been pointed out by one of the makers of Diesel engines. The compressors are made with a greater capacity than is necessary to supply the nett quantity of air required for ordinary running in order to replenish the reserves, and in some cases of twin-screw engines they are made so large that one compressor can supply the needs of both engines. Where too large a compressor is kept working, its air supply is throttled, so that only the quantity actually required is drawn into it. The wiredrawing of the supply leaves the air at the same temperature, but lessens its initial pressure, and so increases the actual ratio of compression, and with it the temperature of the highly compressed air.

It will be seen from the foregoing what an important part of the success of a compressor lies with the lubricant. The oil itself is most probably more easily ignitable, or ignitable at a lower temperature in highly compressed air, than it is in the ordinary atmosphere, as is known to be the case in compressed oxygen. If it decomposes under the influence of high temperatures or pressures, part of the result of the "cracking" is a lighter and more inflammable oil. It is possible that the carbonaceous deposit resulting from the decomposition of the oil is itself spontaneously ignitable in high-pressure air at not very high temperatures. If the oil decomposes and becomes sticky it will tend to clog the passages, and also to interfere with the action of the valves, making them leaky. Both these occurrences will lead to higher temperatures, and so accentuate the evil, especially in the case of separately driven compressors which will naturally be driven faster to compensate for loss of output due to leakage. The difficulties will therefore be increasing ones. It has been suggested that sufficient lubricating oil is carried over from the first and second stages to supply all that is needed for the high-pressure stage, and that consequently there would not be much oil leave this stage to enter the receiver. It may be pointed out, however, that risk occurs at each stage of the compressions, that explosions of the connecting pipes between the stages have occurred, and that, although an explosion of a pipe would not cause so much damage as that of a receiver, yet it would equally put the engine out of action until repairs were made.

These considerations point to the importance of having the total compression performed in at least three stages with intercoolers, so as to lessen the maximum temperature obtained at either stage, and also to the importance of having the passage of the air from the compressor to the coolers as direct and short as possible, and to have these pipes and the coolers easily accessible for cleaning and clearing in the event of any deposits occurring in them. They also point to the fact that oil experts must turn their attention to the production of an oil which will stand not only high temperatures, but high temperatures in conjunction with high air pressures without either cracking, vaporizing, or dispersing into oil fog.

To be concluded.

The International Printing, Stationery and Allied Trades Exhibition was held in the Agricultural Hall from May 13th to 30th. Our visits to see the Exhibition were full of interest, and one could not but be pleased to see the progress which has been made in the art and craft of the printer during recent years; instinctively our thoughts strayed away to the museums wherein lie machines and blocks of other days, when even with these materials some fine work was done. The *Times* claims to have been the first newspaper printed on a steam power cylinder printing machine, one hundred years ago. The firm of Messrs. John Haddon & Co. celebrated the centenary of their history by special noteworthy exhibits in what was termed, in honour of the event, Haddon Hall; this was nicely decorated for the occasion and the excellent machines, variety of types, and other appliances were much admired amid the setting which lent an added attraction to the show. The large number of machines, their variety and the different methods of type setting, with all the accessories, cannot be enumerated within the limits of a paragraph, much less described. This Exhibition is here referred to because of its educational as well as its commercial value, features common to all exhibitions. It may be noted that the Rubber Exhibition, to be held in the Agricultural Hall, promises to be of very great interest, and a great advance on the last one held. Our recollections of the last rubber exhibition are of a highly pleasant nature, and we look forward to the coming one with anticipation.



MOTOR BOATS
FOR THE
"AQUITANIA."

—o—

Two boats have been supplied by Messrs. JOHN I. THORNYCROFT & Co., each boat being fitted with a Thornycroft M4 type Paraffin Motor, developing 30 b.h.p.

Dimensions of boat:

Length b.p.	... ...	30 ft.
Breadth	... ...	9 ft. 6 in.
Depth mid....	...	4 ft. 3 in.
Draught	... ...	2 ft. 9 in.

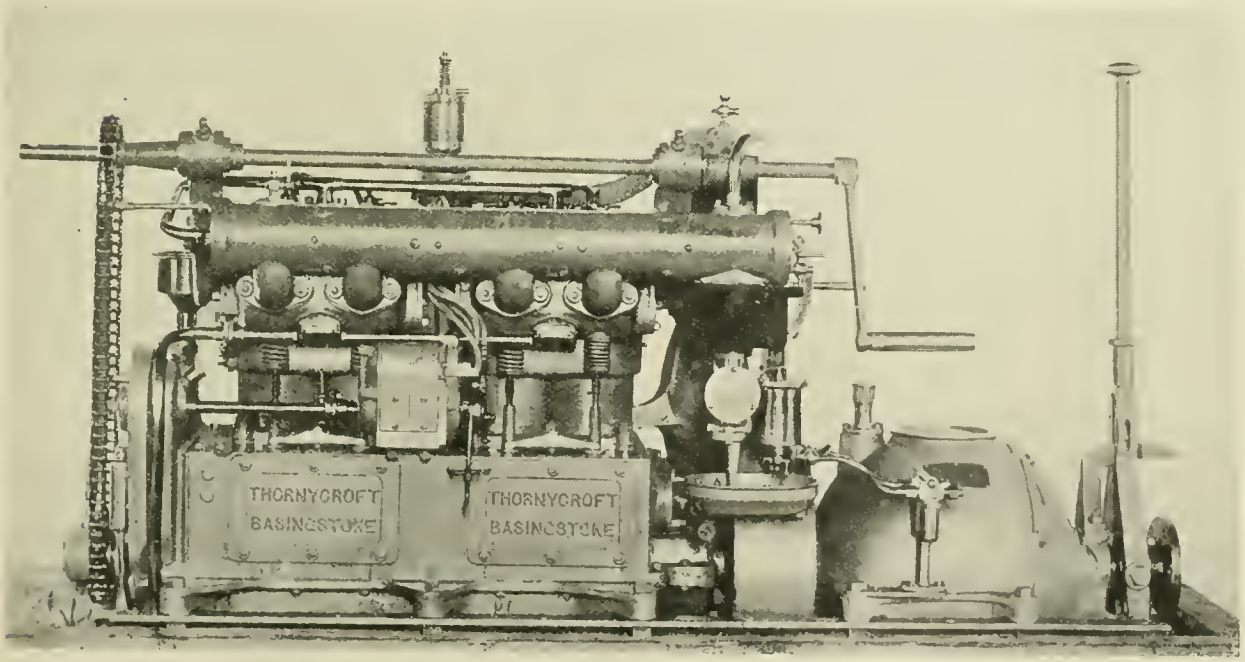
One of the Motor Lifeboats supplied by Messrs. Thornycroft to the *Aquitania*.

MOTOR BOATS FOR THE "AQUITANIA."

MESSRS. John I. Thornycroft & Co., Ltd., have recently completed two motor boats which will be carried by the Cunard Company's *Aquitania*. The motor boats embody many features which are likely to be standardized by all shipping companies owning large steamers. Most of the recommendations made by the Board of Trade Departmental Committee on Ships' Boats and Davits are included in the construction of these boats, which are in length, 30 ft., breadth, 9 ft. 6 in., depth, 4 ft. 6 in. Each boat is fitted with a Thornycroft paraffin motor developing 30 b.h.p.; these motors are arranged to start on petrol until the vapourizer is sufficiently heated, and then turned over to paraffin, thus ensuring an immediate start.

It will be remembered that the Boats and Davits Committee, whilst discussing the question of motive power for ships' boats, went very carefully into the matter of paraffin motors and Mr. John E. Thornycroft was able to show that a paraffin motor of the Thornycroft type can be started immediately on petrol and after about three minutes turned over to paraffin.

The design is a distinct departure from the usual type of ships' boat, its primary function being to tow away the ordinary rowing lifeboats from the scene of a disaster. Each of the two boats carried would be able to tow a considerable number of boats. The wide beam and specially designed lines make them excellent sea boats. A cabin is fitted amidships, housing the motor; the forward end is divided off by a sound-proof bulkhead, forming a room for the Marconi wireless apparatus. These compartments are lighted by eight portholes, and ventilated from the roof by mushroom ventilators. Wells are placed fore and aft of the cabin, each being fitted with large relieving



Thornycroft Paraffin Motor, developing 30 b.h.p., fitted in the *Aquitania's* motor lifeboats.

valves. This arrangement, whilst being criticized by some, was specified by owners and is found to be very satisfactory for handling purposes, when the water drains off from the floors (which are placed well above the water line) very quickly. In addition to the functions of towing, each boat is fitted with accommodation for medical chests, blankets and food supplies, thus in time of emergency the comfort of the passengers in the smaller boats is to some extent arranged for.

An important feature with this type of craft is the wireless installation already referred to, by means of which the boats can be kept in touch with other vessels in the line of shipping. The receiving range for these sets is about 300 miles. The aerial wires are carried on two 25-ft. bamboo masts, which may be lowered on to chocks when not in use. Sling gear is fitted and the boat is slung from davits in a similar manner to the ordinary lifeboat. One of the boats went through her official trials at the latter end of April with satisfactory results, the speed obtained being nine miles per hour.

It will be remembered that in the case of the *Titanic* disaster how the different boats, after leaving the ship, became very scattered, some being overloaded. With a boat as described above, in such a crisis the whole complement of the shipwrecked boat's lifeboats could be shepherded and cared for until outside help arrived.

LETTERS TO THE EDITOR.

BOARD OF TRADE CERTIFICATES.

To the Editor, MARINE ENGINEER & NAVAL ARCHITECT.

Dear Sir,—Will you kindly allow me, as a humble five-eight sort of an engineer, to add my protest to those which you have already published in your Journal, against the unprecedented action of the Board of Trade in connection with the regulations for the Examination of Marine Engineers.

I think that the article which first started the correspondence puts the matter in a nutshell, and when it is read side by side with the letters which have since appeared, surely no person, who has the interests of marine engineers at heart, can have any doubt of the ultimate effect of such regulations.

Surely the Board of Trade is not autocratic, and when they realize, as they must, that sea experience should not be mixed up with general education, they will possess sufficient manliness to rescind the regulations before they come into operation, for their effects will be felt by all who follow marine engineering.—Yours, etc., A. G. C.

London, April 22nd, 1914.

To the Editor, MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—Will you allow me, through the columns of your valuable review, to express my views on this contemplated step of the Board of Trade, *viz.*, the lengthening of sea service and the substitution for engine-room service of time spent at an approved technical school?

While every right-thinking engineer hails with satisfaction the first part of this projected scheme, the latter part will have a deplorable reception.

It is admitted on all sides—by the superintendent engineers who manage the engineering business of our shipping companies and the engineers who run the engines on the ships—that such a step would be disastrous. The most valuable education that a sea-going engineer gets, and the education that makes him of value to the shipowner, is what he gains by practical experience in the actual running of propelling plant, and this experience can not be gained through any other agency.

Sea experience can have no substitute! What sane shipowner would give a man a job as a navigating officer whose whole experience of navigation had been gained ashore in a nautical college with the aid of text-books and toy ships? Equally absurd is the idea that the training which an engineer gets at sea can find a substitute in tuition at a technical school.

While no one would for a moment depreciate technical knowledge—in fact I am of opinion that at no time has a theoretical knowledge been more essential than now, and it would be well if engineers would strive to know as much as they can of the theory of those great forces and laws which govern everything that an engineer deals with in his daily round—still, this theoretical knowledge should not be sanctioned to take the place of what is more important.

Every engineer who has an interest in his profession *will* educate himself in theory and he must be a busy man who finds no time at all to devote to this branch of study. That knowledge, together with the indispensable sea service, is what gives a man his value as an engineer, and anything that would tend to detract from these qualifications must be strongly opposed by engineers.

But such a step as this contemplated by the Board would have a worse and further reaching effect than what I have already summarized.

What is it that gives the sea-going engineer the *prestige* that he has at present? It is simply because of the fact that he and he alone can fill his place on a ship. Then why should we, as engineers, allow our status to be in any way lowered by the inevitable taunt that our business can be taught us in a school?

I feel quite convinced that should the Board's project ever be adopted, the status of the marine engineer will slowly but surely fall below that of the skilled mechanic. For that reason alone, we have good reason to do all in our power to postpone this evil hour.

Another evil effect:—We have, as in other professions, a number of young engineers who go to sea who are not in any way useful or ornamental to the profession. They hope to get along as easily as possible, and a technical school, where they could find a substitute for sea-time, would be a splendid institution for such as they. There they could fritter away their time doing little or nothing, and the Principal of the institution would, in duty bound, have to give them a certificate for the time spent there.

Such a state of matters, it is needless to say, would be demoralizing, and a young engineer trained in this way would be a poor acquisition in any ship.

All engineers who have the interests of the profession at heart should do their utmost to oppose this latter part of the Board's projected scheme, for it is rotten, root and branch.

THIRD ENGINEER.

London, April 22nd, 1914.

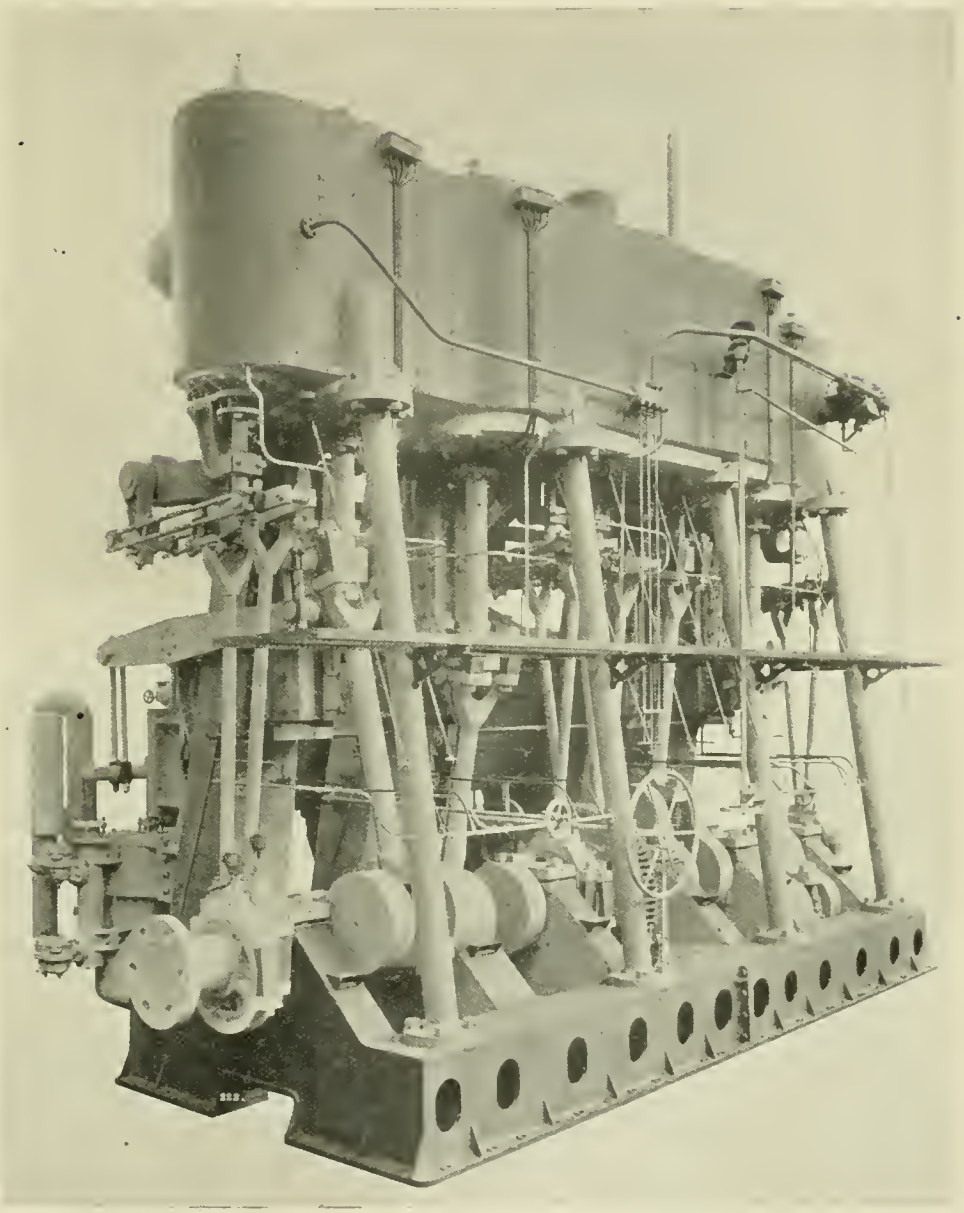
INTERNATIONAL ENGINEERING CONGRESS, 1915.—The programme of papers for the various sections of this Congress to be held in San Francisco is practically completed, and notices of them will be published shortly. The first volume of the publication of the Congress will consist of a series of articles descriptive of the various technical features of the design and construction of the Panama Canal.

THE "AEROTUG."—The condition of the majority of canals in the United Kingdom at the present time is such that owners who would otherwise employ full-powered craft are compelled to continue with the old-fashioned method of horse towing. There appears to be a good possibility of the difficulty being overcome by the employment of aerial propelled tugs. Messrs. James Pollock, Sons & Co., Ltd., have recently designed and constructed one of these unique boats propelled by a 15-b.h.p. single-cylinder Bolinder direct reversible crude oil marine engine, and some days ago the preliminary trials were run, when the satisfactory speed of five miles per hour was obtained with the vessel working against the Thames current. The length of the vessel is 30 ft. and she has a draught of about 8 in.

very high-speed light cruisers which had been aptly termed destroyers of destroyers, or protectors of battleships, and he thought that every critic of naval design was agreed on the great efficiency of the design of the ship to which the *Galatea* belonged. Because of this they as a firm were proud that they had been entrusted with the building of these very interesting and important vessels.

SCREW STEAMER "SPRINGWELL."

THE fine new steel screw steamer *Springwell*, built by Messrs. Wood, Skinner & Co., Ltd., Bill Quay-on-Tyne, to the order of Messrs. The Well Line, Ltd., Newcastle (Messrs. Tyzack and Branfoot, managing owners), for their London-Calcutta trade, left the Tyne on May 6th for her official trial trip. This vessel, which is of the following dimensions:—length between perpendiculars 425 ft., beam 54 ft., depth moulded 33 ft., with very lofty 'tween decks,—is built with two complete steel decks, poop, fitted as an acid hold, long bridge and top-gallant forecastle, with large strong room for specie in the deck house; she has special cargo gear capable of lifting up to 30 tons and No. 4 hold is fitted with lock up for special cargo. She is also fitted with a complete installation of wireless telegraphy, and with all necessary fire-extinguishing appliances.



Propelling machinery for S.S. *Springwell* (Well Line), constructed by Messrs. The North-Eastern Marine Engineering Co., Ltd.

The propelling machinery, which has been constructed by Messrs. The North-Eastern Marine Engineering Co., Ltd., of Wallsend and Sunderland, at their Northumberland Engine Works, Wallsend, consists of a set of their latest type of quadruple-expansion engines, having cylinders 25½ in., 36 in., 52½ in. and 76 in., with a stroke of 54 in., steam being supplied by three large steel boilers working at a pressure of 220 lbs. per sq. inch.

Both ship and engines have been constructed under Lloyd's Survey, to take their highest class, and also to the specification and survey of Messrs. Thompson, Eyres & Bryers, of Sunderland.

The results of the trial were very satisfactory, a speed of about 14 knots being obtained. Amongst those present were Mr. A. Walker, of Messrs. Tyzack and Branfoot, Newcastle; Mr. Leslie Skinner and Mr. G. P. Purchase, of Messrs. Wood, Skinner & Co., Ltd.; Mr. Bryers, of Messrs. Thompson, Eyres and Bryers; Mr. D. Myles and Mr. J. Daglish representing the engine builders. After the trial run the vessel proceeded to Middlesbrough to load.

THE Bombay Port Trust, through their consulting engineers and agents, Messrs. Sir J. Wolfe Barry & Partners, have placed an order with Messrs. Wm. Simons & Co., Ltd., Renfrew, for a very powerful bucket hopper dredger for the improvements of the port and the approaches thereto. The new Bombay dredger is to be built on the lines of the U.S. *Corozal*, constructed by Messrs. Simons & Co. for the Panama Canal, and which has done excellent work in dredging a very large quantity of rock which had not been previously drilled or blasted.

OBITUARY.

Alexander Dunbar.

AS briefly noted in a footnote before going to press with last issue, there passed away with very distressing suddenness on April 4th, at 25, Park Drive South, Whiteinch, Glasgow, Mr. Alexander Dunbar, who had been appointed chief engineer of the new Cunard liner *Aquitania*. Residing usually, of course, near Liverpool, Mr. Dunbar with his wife had occupied rooms at the above address in order that he might more frequently visit the vessel undergoing completion at Clydebank, and familiarize himself with the details of the engine-room department.

Mr. Dunbar, who was a native of Montrose, was in his 53rd year, and his decease followed an attack of pneumonia contracted about the beginning of this year and from which he had not sufficiently recovered when, in his anxiety to be out and about during the completion of the great vessel, he resumed his overseeing duties. Of a most unassuming nature and possessing a robust constitution, his immediate friends and connections, both in Liverpool and Glasgow, as well as further afield, were greatly stricken with the suddenness of his demise. He had been in the Cunard service for over thirty years, having joined in May, 1883, and previous to his appointment to the *Aquitania* he was chief on the *Lusitania* from February, 1911, and took her on her maiden voyage across the Atlantic under the direction of Mr. John Currie, the consulting engineer to the Cunard Line, under whom also Mr. Dunbar had served as second on the *Mauretania*.

As a youth Mr. Dunbar started work in an engineering shop in his native town of Montrose. From thence in due time he proceeded to Glasgow, where he served as journeyman for a time and also at Paisley. In May, 1883, as above stated, he joined the Cunard service, and during the long period of over thirty years he served in many of the company's crack vessels, including the *Aurania*, *Bothnia*, *Palmyra*, *Gallia* *Pavonia*, *Catalonia*, *Scythia*, *Samaria*, *Etruria*, *Lucania*, *Saxonia*, *Caronia*, *Mauretania* and *Lusitania*. His great ability and capacity for hard work brought him rapid promotion, and his success in the great ocean greyhounds, the *Mauretania* and *Lusitania* especially, was such that the vastly important work of superintending the engineering of the *Aquitania* was unhesitatingly put into his hands. He knew almost every nut and bolt that went to the construction of the machinery. The system of "thorough" had always been his motto, and he had most convincingly proved its value. When he was in charge of the *Lusitania* he accomplished a notable feat in rectifying the lineage of one of the main shafts and its bearings without the vessel having had to be stopped, and in bringing her safely into port. He was highly complimented by his Board of Directors on the courage and skill he in this way evinced, and after the machinery was thoroughly put right again he was sent by the Company to travel on her as a saloon passenger in order to see that everything went smoothly.

Mr. Dunbar, as has been stated, had his home in Liverpool, of which place his wife is a native. Their only son, who is an officer in the Elder Dempster Line, had visited his parents in Glasgow only a few days before his father's death, and sailed just before the sad event occurred, little dreaming that he would never see his father again.

MARINE MOTOR NOTES.

THE developments in industrial enterprises in various parts of the world which have been in progress during the last few years have tended to rouse the spirit of enterprise in the direction of the best means of transit and transport, and, naturally, the motor-driven boat has come in for a good share of patronage for river and coastal work. Especially of late have orders been multiplied for motor vessels to be engaged in South America and Africa for local traffic, to carry goods and passengers, with facilities for towing. In districts where the rivers and estuaries are shallow, the light-draught boat of the aero type is on trial for towage purposes. The steel sailing barque *Beelem* is about to be fitted, to the order of the Duke of Westminster, with twin oil engines of the hot-bulb type and directly reversible. The Arctic Gold Exploration Syndicate have placed an order for a 130 h.p. set of oil motors, and there are enquiries for sets suitable for cargo barges, some of which will probably result in the placing of orders soon. The Trinity pilot schooner *Vigilant* will, in the course of a few weeks, receive the set of 80 h.p. engines now in course of construction for her. The motor barge is more frequently seen now in the docks fed by the Thames, but there is room for more, and by means of this method of movement, the canal traffic would be greatly encouraged and the canals improved—there is need for it.

FOREIGN NOTES.

Argentine Republic.

THE Government has placed an order for a floating dock of 4,000 tons carrying capacity with the North Sea Works in Germany, which secured the order in strong competition with English, French and Italian firms.

Austria.

The two river monitors which are in course of construction at Linz and at Budapest are to be delivered in three or four months. They have a displacement of 536 tons, a length of 180 ft., beam 34 ft. and a draught of 4 ft. The engines will develop 1,500 i.h.p. and give a speed of 13 knots to the boats.

The cargo steamer *Erny*, built at the yard of Monfalcone has, on completion, been taken over by the Austro-Americana Co., to whose order the steamer was built. The same shipyard has two further cargo steamers in course of construction, for the Austro-Americana Co., of 7,000 tons each and a large passenger steamer of 20,000 tons. A cargo steamer of 6,700 tons is also being built for the Cosulich Shipping Co.

The Austrian Navy scout *Saida*, built by Cantiere Navale, of Monfalcone, and already fully described in this paper, has been delivered to the Navy after her trial, which lasted four weeks. The s.s. *Monfalcone*, a small coasting steamer built by the same yard and launched on the 2nd May last, will be delivered in a few weeks to the Society Monfalcones. She is intended to carry passengers and cargo, and will be able to average 13 knots. The t.s.s. *Innsbruck*, for the Austrian Lloyd, and a sister ship of t.s.s. *Hungaria*, described last month, was launched on the 9th May by Cantiere San Rocco, who are also now building a duplicate of the s.s. *Laguna*, a cargo steamer 390 ft. by 53 ft. 9 in. by 32 ft. The t.s.s. *Pola*, launched the 12th May by the Stabilimento Tecnico San Marco, is a coaling ship for the Austrian Navy. She is able to carry 7,000 deadweight tons on board, and is especially fitted for fast carrying and discharging coal.

Brazil.

The battleship which is to be constructed in the place of the *Rio de Janeiro* is to have a displacement of 28,000-30,000 tons, and to be armed with ten 14½-in guns.

China.

The three small cruisers which ar
for China at the Naval Triestino at T
a length of 335 ft., a beam of 41 ft
Their delivery is to be effected by
machinery is to be installed and
maximum speed of 32 knots

France.

The *Château Yquem* has been
the Chantiers de la Loire at Na
this steamer are :—Length, 289 ft.
depth, 24 ft. Her triple-expansi
will give the vessel a speed of 11½ l
boat built to the order of the Cy
the Chantiers de la Seyne, has ju
and has started on its first voy
steamer is of 15,000 tons and ha
first-class passengers, 250 second-c
for a crew of 200 men, totalling 2,5(
mail and passenger steamer, built
Atlantic Company, has been launc
Seyne. Her length is 565 ft., bear
ment 17,000 tons. Combination
will be installed and a speed of 18

The Admiralty is now considerin
ships, which are each to have a spe
to two battleships were laid in Apr
the other at Lorient. These vessel
class. The four vessels of the "N
course of construction, are to be eq
Guyott-du-Temple boilers. Two
motors, each of 2,400 i.h.p., have
marine *Nereide*, 800 tons. The late
displacement are to be provided w
of 4,000 i.h.p.

Germany

The following trial trips have
fishing steamer, built at the Unterw
the North Sea German Steam Fish
beam, 22 ft.; moulded depth,
engine of 375 i.h.p. Two similar
construction at the same yard.
cargo steamer built at the Oder W
of the Hamburg-America Line. S
provided for taking in long bars
of the triple-expansion type and t
Grossherzog Friedrich August, a motor
developed 600 i.h.p. Speed, 9½ knots. *Kigoma*, Imperial mail steamer built at the Reiherstieg shipyard, Hamburg, for the German East African Line. Length, 440 ft.; beam, 53 ft.; moulded depth, 32 ft. Carrying capacity, 7,700 tons on 26 ft. draught. Quadruple-expansion engines, 4,800 i.h.p. Speed, 14 knots.

The following launches have latterly taken place :—The F. Lemm Shipyard and Engineering Works at Boizenburg on the Elbe.—Two sea lighters to the order of the Hamburg South American Line, to be employed in the coastal service. They will be towed to their destination. Length, 125 ft.; beam, 27 ft.; draught, 9 ft. The Shipyard of Muske & Co., Stettin.—The *Arucas*, of 3,100 tons, cargo and passenger steamer. Length, 290 ft.; beam, 39½ ft., and 16½ ft. draught. Her engine of 1,350 i.h.p. will give her a speed of 10½ knots. The Flensburg Shipyard at Flensburg.—The *Lübeck*, cargo steamer, to the order of the German Australian Steamship Co., Hamburg. Length, 405 ft.; beam, 52 ft., of 8,000 tons carrying capacity. The Weser Shipyard, Bremen.—The *Santa Clara*, to the order of the South American Line, 9,000 tons carrying capacity. Speed, 10 knots. The Bremen Vulcan Shipyard.—The *Santa Isabel*, for the Hamburg South American Steamship Co. Length, 403 ft.; beam, 52½ ft.; moulded depth, 33 ft. Carrying capacity, 9,000 tons. Triple-expansion engine, 2,500 i.h.p.; speed, 10½ knots. The Neptune Shipyard, Rostock.—*Totmes*, cargo steamer for the Kosmos Steamship Co., Hamburg. Length, 480 ft.; beam, 61 ft., and moulded depth, 40½ ft. Carrying capacity, 12,000 tons on 26 ft. draught. Engine, 3,700 i.h.p.; speed, 12 knots.

anomaly in connection with the attitude of the Association is, that its members were allowed to exhibit at other exhibitions in connection with mining, laundry and other industries. A barrier has thus been erected against those of the members whose tools and machines are more closely associated with shipbuilding and marine engineering. We understand that negotiations are still pending, and it is possible that wise influences may still prevail to free the members of the Association from the penalty which has been threatened. Why one exhibition should be singled out, and a few members informed "thou shalt not" and others informed "thou mayest exhibit" at other exhibitions, is somewhat curious to those whose knowledge of the vital principle on which the Association is founded is not, perhaps, so intimate as those who expound its tenets. The position of the members who have booked space has evoked a good deal of sympathy, and at the largely attended committee meeting recently held the comments made were very much in favour of the intending exhibitors, and, in view of this, the chairman expressed the hope that their position would be maintained. The following firms have booked space during the month: Messrs. Allen West, Ltd; W. & T. Avery, Ltd.; J. W. Barnes, Rock Ferry; Béliard, Crighton & Co., Antwerp; Compayne, Ltd.; W. Denny Bros.; W. H Dorman & Son; W. Doxford & Son, Ltd.; Higginson & Co.; J. Kaye and Sons, Ltd.; Leyland & Birmingham Rubber Co., Ltd.; Patents Castings Syndicate; Priestman & Son; E. V Questier; Scholes & Co.; Stuart & Fisher; Stuart Turner Valve Co.; Vislok, Ltd. The series of papers and lectures is in course of arrangement, but they are not yet settled in detail.

with the attendant tugs she steamed a short distance down the Firth, afterwards returning to coal. Hundreds of thousands of spectators occupied vantage points on both sides of the river as the vessel passed down from Clydebank to Greenock, and here was a gratifying absence of any serious mishap. The *Aquitania* left for Liverpool on the following Wednesday, and arrived there on Thursday, May 14th, to prepare for her departure on her maiden voyage on May 30th, under the command of Capt. W. T. Turner. The *Aquitania* is 901 ft. in length overall, and 97 ft. wide, and is thus the largest British liner in service. Her guaranteed speed is 23 knots, and it is confidently expected that she will exceed this, as upon her trials a speed of 24 knots was reached. Her Parsons turbine machinery, which develops approximately 60,000 s.h.p., has also been constructed by the builders of the vessel, Messrs. John Brown & Co., Ltd. By the courtesy of the Cunard Line a Press inspection of the vessel took place on the day prior to sailing.

...ES OF TO-DAY.

PROBABLY no event in the history of Clyde shipbuilding—certainly none in the annals of Clyde navigation—was ever so keenly and generally looked forward to as the transfer of the great Cunard liner *Aquitania* from the builders' basin at Clydebank to the comparatively open waters of the Clyde at the Tail of the Bank. This memorable event was safely and triumphantly accomplished on Sunday, May 10th, which for years to come will be known and spoken of as "Aquitania Sunday." Time and tide regulated the selection. Sunday traffic on the narrow river is at low ebb, and the tide and wind (or rather absence of the latter) were at the best. Shocked Sabbatarians protested against the facilities provided for witnessing the event, yet strangely enough the hour of church services was deliberately changed in many places in order that members of the congregation could witness the scene. The *Aquitania* was drawing slightly over 30 ft. of water, even keel, and about 11.30 forenoon, with the assistance of eight tugs for guiding purposes, she proceeded down river under her own steam, and about two hours thereafter arrived at the Tail of the Bank, where, dispensing

NAVAL architects cannot afford to lag behind in up-to-date knowledge of any allied industry, and the probability is that the water-aircraft of the future will be designed by the naval architect, with or without the assistance of the aeronautical designer. The North-East Coast Institution of Engineers and Shipbuilders are to be congratulated in that, some time back, they instituted a section to be devoted to aeronautics, and are developing along this line by getting leading men in the flying world to read papers. This cannot but have a marked effect on the ultimate design of seaplanes, and will probably re-act on the design of skimmers, if not of more important craft. However, even skimmers have a commercial value, being in growing demand for countries abroad where there is abundance of water, which, however, owing to its small depth, is closed to ordinary displacement craft. It is to be hoped that other societies connected with naval architecture will follow the example of the North-East Coast Institution.

The best way to get a comprehensive knowledge of the present-day seaplane would be to study briefly the characteristics of those craft exhibited at the recent Olympia Show. The exhibits in this section were

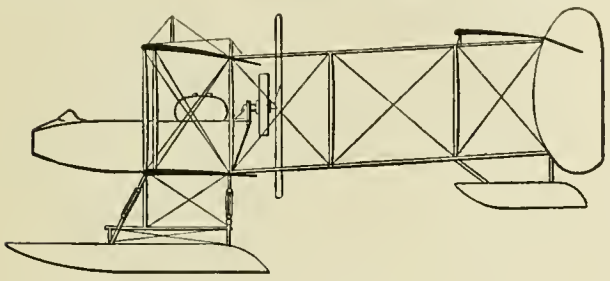


FIG 3

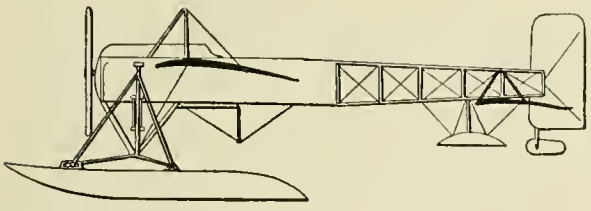


FIG 2.

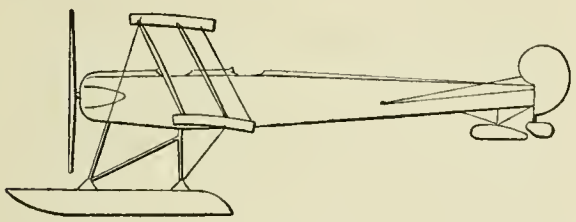


FIG. 1.

exceedingly interesting, not only individually, but also collectively, as indicating the evolution from the aeroplane fitted with floats to the machine in which seaworthiness is a chief consideration, at least equal in importance to that of flying. It will be instructive to keep in mind this evolution when considering the various exhibits in this class; we then find that we have three seaplanes fitted with plain floats, three with stepped floats and three of the boat form, also stepped. Generally speaking, aeroplanes, pure and simple, have assumed a standard form, but the standard form of seaplane is still a thing of the future; however, the machines exhibited at the Olympia seem to point to the line along which development of the seaplane may be looked for. Our attention is concentrated on the water portion of the machine, so that the purely aeronautical part will not be dealt with, unless it affects directly the seaworthiness of the machine as a whole.

Plain Float Machines.

The Avro Company exhibited a seaplane which has two main floats stayed by steel rods from the underside of the fuselage. These floats, as can be seen (Fig. 1), have turned-up bows to minimise the shock against waves. The shock experienced by the floats when the machine is taxi-ing over the surface of broken water is very severe. A considerable speed must be attained before the lift on the planes produced by the relative wind is sufficient to cause the machine to rise up into the air; this speed is at least thirty miles an hour in the general case, and at that speed the impact of the float on a wave produces a severe shock to the machine. Again, allowance must be made for an inexperienced pilot taking the water badly, or for a case of minor accident, which may lead to the water being taken at a fairly steep angle, and not according to best practice. The best landing is that in which, after a *vol plane* with the engine shut off, the motor picks up just before the water is reached, allowing of the machine being run along practically horizontal and being dropped lightly on to the water by the engine being switched off. The pilot always runs into the wind before landing, in order that the speed of the machine relatively to the water may be as small as possible; the wind more or less counteracting his speed.

Shock-absorbing of the main floats in this machine is achieved by the lower end of the struts above mentioned passing inside the hull of the float, where they carry a cross-piece. Around this cross-piece and a transverse member of the float, rubber is wrapped, the stretch of which absorbs the shock without transmitting it to the machine as a whole. To obtain watertightness where the strut enters the float, stout fabric is fitted round the hole, and this jelly-bag arrangement allows for the stretching of the rubber. The floats themselves are divided into watertight compartments, so that local damage will not flood the whole. The tail float is attached to the underside of the fuselage by a connection which has a certain amount of flexibility, and at the after-end of this float there is a water-rudder by which the machine can be steered when taxi-ing at speeds at which the air-rudder is ineffective. This tractor seaplane is a two-seater driven by an 80-horse power Gnome engine, the total machine weighing 1600 pounds, and carrying a useful load of 650 pounds, the useful load, of course, being a criterion of efficiency. The range of flying

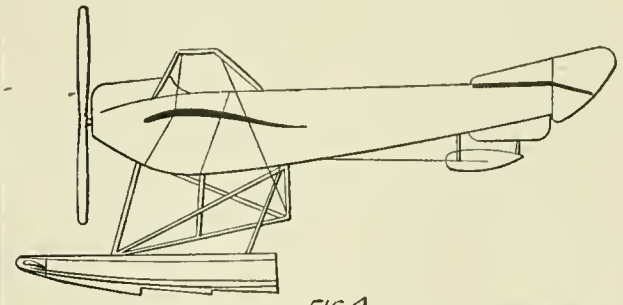


FIG. 4.

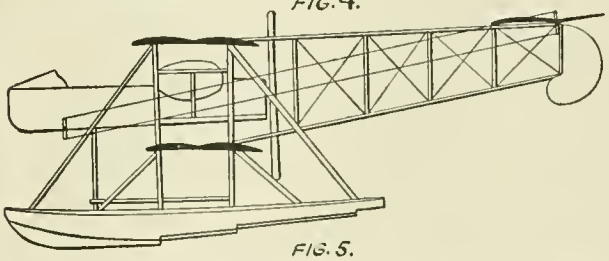


FIG. 5.

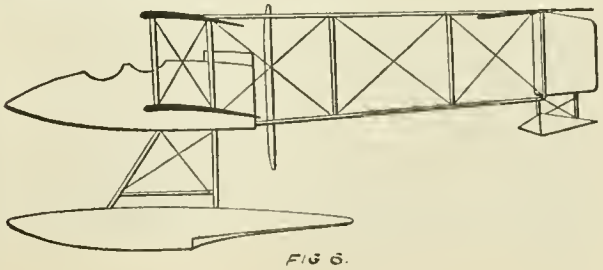


FIG 6.

speed of this machine is from eighty-three to thirty miles an hour, the lower speed being of much greater importance than at first appears, as it is the speed at which the machine can rise from the water, and is also the safe speed at which it can glide down to effect a landing.

The Blériot seaplane (Fig. 2) has Tellier maple-wood floats, and these again are not stepped. The forward ends of these floats have a good sweep up, and the attachment to the underside of the fuselage is accomplished in a very interesting manner. A series of triangles, made up of steel tubes, hinge from a point somewhat abaft the middle of length of the float, while the forward end of the arrangement slides in a slot running in a fore and aft direction. The usual Blériot method of shock-absorbing is adopted on this machine, that is to say, a sleeve carried on the ends of rods attached to the float, moves up a vertical rod attached to the fuselage, movement being restrained by rubber. The tail float is flat on the under-side, and on the upper has a curve in the longitudinal direction which is the arc of a circle. This machine also has a water-rudder which is attached to the air-rudder, and therefore works in unison with it. This tractor monoplane is a two-seater and attains a speed of sixty-eight miles an hour, with an 80-horse power Gnome engine. Its total weight is 1670 pounds, and it can carry a useful load of 550 pounds.

The H. Farman biplane (Fig. 3) has its propeller placed behind the nacelle, and its rear elevator, vertical rudder and tail float are all carried on outriggers. Here again we have two plain main floats without any step in them, one float moving independently of the other, and so supported that it not only moves vertically when subjected to shock, but also can rock slightly in a transverse direction, the result being a very flexible connection suitable to broken water. The shock-absorbing in this case is obtained by the vertical members of the float attachment being telescoped with a helical spring fitted between flanges on both upper and lower portions. This spring takes the compression in the member, and rubber bands passing round cross-pieces on upper and lower portions of the strut take the tension. The tail float is somewhat similar to the main floats. This biplane is also a two-seater, with a speed of fifty-nine miles an hour and carries a useful load of 660 pounds, its engine being a seven-cylinder 80-horse power Gnome.

Machines with Stepped Floats.

The Nieuport monoplane (Fig. 4) has its two main floats stepped to facilitate the attaining quickly of a speed sufficient for rising. These floats are not unlike a very broad and shallow boat with a wide keel, the keel alone being stepped. The upper portion of the float is canvas, the lower portion cedar. The whole nose of the float is of metal with metal vanes projecting on either side, these being, presumably, to prevent diving when alighting and also to break up the surface waves when taxi-ing. Under the tail of the fuselage there is a cigar-shaped float with a rigid strut connection to the fuselage and wire staying to the fore-end of same. This tractor seaplane is a two-seater, attaining a speed of sixty-five miles an hour with 100 horse-power Gnome engine of nine cylinders, the total weight of the machine being 1607 pounds, and the useful load 616 pounds.

Before passing on to the next seaplane in order of development, it is interesting to note a Skimmer shown by the above firm. This consists in three portions: the centre hull and two side floats, the idea being that at low speeds all three skim on the water, but at high speeds only the side floats are water-borne, while the centre portion or skimmer proper is entirely out of the water; to this end the side floats are somewhat lower than the centre hull. An interesting point in the side floats is that each is composed of three boxes, one behind the other, each of which can be pivoted about the after-end, so altering the angle of incidence that it may agree with the speed at which she is skimming, and so obtain the best results. At about thirty-two miles an hour the centre hull lifts clear of the water, and after that there is very little resistance experienced, which should lead to high speeds. The hull is 20 feet long, 6½ feet wide and 7 inches draught when at rest. It is fitted with a 160 horse-power engine driving an air propeller; at either side at the back of the hull are water-rudders. Each of the side floats is 15½ feet long and 20 inches wide.

The seaplane built by J. Samuel White (Fig. 5) has two canoe-shaped main floats, which have several steps under each. These floats have cambered decks which are given a sheer, and the entire float is built of wood covered with canvas. The propeller in this case is behind the nacelle, and the tail plane and air-rudder are carried on outriggers. An interesting point in the aeronautical part of this machine is the double camber which is given to the upper side of the planes, resulting in what is, practically, two ordinary planes joined in tandem. The suction on the upper part of a plane accounts for about three-fourths of the total lift of the plane, the direct reaction of the relative wind on the lower surface supplying the remaining fourth. By leaving the lower part unaltered and double cambering the upper surface as indicated, an increased lift was anticipated by the designer, and results have shown that he was right in his assumptions. This two-seater has a range of flying speed from 72 to 35 miles an hour with a 200 horse-power Canton-Unné engine of fourteen cylinders; the total weight of the machine is 3,500 pounds, with a useful load of 900 pounds. A stockless anchor and a cable are carried, and this is a feature in those seaplanes exhibited by makers of water-craft.

The Hamble River Company exhibited a seaplane (Fig. 6) which is interesting as being their first venture in this direction. The nacelle is cigar-shaped, and so are the two main floats, which are stepped; abaft this step a wooden keel is run. The tail of the machine is protected from damage by the water by having beneath it a float. The workmanship on both the nacelle and the main floats of this machine is very fine, as might be expected of the firm from which it emanates. Shown alongside was the first dinghy designed to be carried on a seaplane; this is clincher-built of mahogany and carries not only oars, but a small mast and sail. An anchor and cable, also a bomb-throwing apparatus, are carried on the seaplane, and if desired the planes can be removed in fifteen minutes. This machine has a range of speed of from 65 to 32 miles per hour with a 150 horse-power N.A.G. engine of six cylinders; it is a two-seater and weighs 2,550 pounds in all, with a useful load of 1,250 pounds.

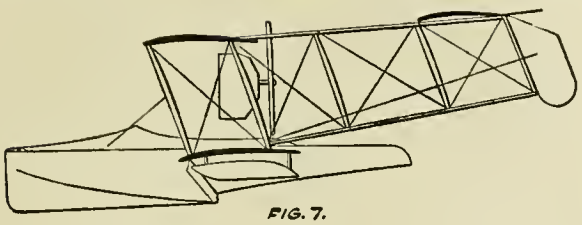


FIG. 7.

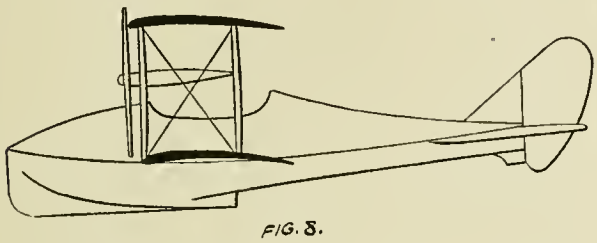


FIG. 8.

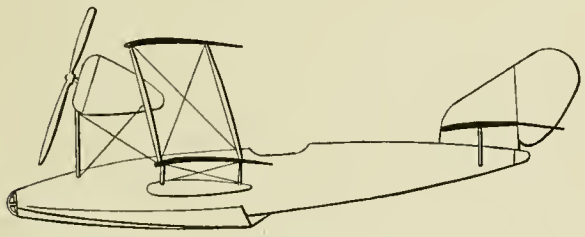


FIG. 9.

MACHINES WITH SINGLE FLOATS OF BOAT FORM.

The Sopwith Flying Boat (Fig. 7) is a well-tried model composed of a single hull with one step, the bow of the hull running well forward of the planes, so obviating the danger of tripping up when alighting. There is a good cutting edge on this hull for rising in rough water, and leading down towards the step are ribs, seemingly intended to guide the flow towards the step; abaft the step are similar ribs. The work in this machine is of high excellence, being Saunders' construction, with waterproofed canvas in between layers of thin mahogany. The hull is divided into watertight compartments, and is 20 feet long and 4 ft. 9 ins. broad. In order to get air behind the step and so assist in the speedy unsticking of the skimmer, the usual practice of piercing the hull is not followed, but the air is led down two brass conduits which are almost flat against the sides of the hull. The tail plane and rudder are carried on an outrigger, and wireless installation is fitted. The lower wings incline upwards from the hull so as to allow of a considerable inclination without the wing tips touching the water; under these tips floats of the ordinary form are fitted. This two-seater has a range of speed of from 70 to 40 miles an hour, has a total weight of 3,200 pounds and can carry a useful load of 1,000 lbs. The engine is a 200 horse-power Canton-Unné, with 14 cylinders.

The next exhibit, the Perry Beadle Flying Boat (Fig. 8), is somewhat on the lines of that previously described, but with this difference, that instead of the hull stopping short a small distance behind the lower plane, it is swept onwards and terminates in a regular fish tail, the vertical fin and vertical rudder being carried directly on this tail. The construction of the hull is on the Saunders system, but with the layers of planking sewn together with copper wire instead of being riveted. There is no distinct break in passing from the after end of the hull to the tail or the fin, but the lines are beautifully swept out, giving an excellent appearance and indicating first-class work. The striking feature of this boat is that the lower plane is of Saunders construction, and is made water-tight; this plane is partly immersed when the flying boat is lying at rest, and on it she planes when rising. It is claimed that there is sufficient buoyancy in these lower planes to float the machine were the hull flooded. The engine is in the hull, and the twin tractors are driven by chain and sprocket gearing. The hull of this boat is 24 feet long by 3 feet wide and seats two persons. The light weight of the machine is 950 pounds and the speed obtained with an 8-cylinder 60 horse-power E.N.V. engine is 64 miles an hour.

The last of the seaplanes is the Pemberton Billing Super-marine (Fig. 9), which is a long cigar-shaped structure, to the bottom of which is attached what is practically the skimmer portion of a high-speed motor boat. Great care has been taken in this design that, while weight is cut down as much as possible, strength is never sacrificed; this object is achieved by a careful selection of woods of varying strength to meet the varying strength requirements. The upper portion of the hull is of two layers of spruce, which thickness is gradually increased layer by layer till, at the keel, we have five thicknesses. The step which, as mentioned above, is separate, though fastened securely to the hull, is made up of spruce, mahogany, rock elm and oak, the weakest of these woods being at the bow and the strongest at the step, where greater strength is required. The hull is stayed by cross-bracing, and watertight bulkheads are fitted. The tail plane and rudder are carried on an erection of struts at the after end of the hull. The engine is in a stream-line casing well above the hull and with the shaft inclined downwards and backwards. One reason for this is that the position of the propeller is such that it is expected to aid materially the rising from the water; another is that there will not be any serious alteration in trim as the engine is switched on and off, this alteration in trim being very troublesome when the line of thrust is far above the hull, as it is in many flying boats. Provision is made that the casing which encloses the motor and the tank can be flooded by means of a fire-extinguishing apparatus. The engine can be started from the pilot-seat by means of a starting handle at the after end of the engine casing. Under the tip of each of the lower wings is a small float similar to the centre hull. An interesting device is a four-fluked stockless anchor which is housed in the nose of the hull and which, by compressed air, can be shot six feet in front of the hull. The speed of this air-boat is 50 miles an hour with a 7-cylinder 50 horse-power Gnome engine; the total weight of the machine is 970 pounds, and it carries a useful load of 220 pounds.

Gratification will be felt that the problem of the seaplane is advancing on lines which are no longer trammelled by the conservative idea of the air part of the machines being the chief consideration, and the water portion just a necessary evil. Stimulus will be given to design in this direction by the competition for seaplane designs instituted by the Russian Government, particulars of which competition may be obtained from the Russian Naval Attaché, 26, Gledhow Gardens, South Kensington, S.W.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent).

Work for Clydebank.—Messrs. John Brown & Co., Clydebank and Sheffield, as members of the group of British firms which about six years ago secured the seven millions contract from the Spanish Government for armaments, shipbuilding materials and engineering work (the other firms being Vickers, Ltd., and Armstrong, Whitworth & Co.), are again likely to share with the other two firms a contract for armaments, totalling, it is believed, five and a half millions sterling. The contract is sure to bring a considerable amount of work both to Sheffield and Clydebank.

Transfer of the "Transylvania."—By the time these notes appear Scott's Shipbuilding and Engineering Co., Greenock, will have launched (23rd May) the large twin-screw steamer *Transylvania*, the order for which they received from the Cunard Company in November, 1912. She is a vessel of over 14,000 tons gross, 548 ft. in length, 62 ft. in breadth, 45 ft. in depth, and was intended for the trade of the Cunard Company between Fiume and New York. She is to be propelled by Parsons steam turbines, having their power transmitted to the twin propellers by Parsons helical reducing gear. She will be one of the largest vessels having this type of machinery. From the point of view of ownership and management it is of much interest to state that the *Transylvania*, through arrangements between the Cunard Company, Liverpool, and the directors of the Anchor Line (Messrs. Henderson Brothers, Glasgow)—between whom, as is well known, a close working understanding has existed for some time, enabling vessels of the Anchor Line sailing from Glasgow to frequently take New York Cunard Line sailings from Liverpool—will be transferred to the Anchor Line. It is understood that she will be used by this Company in their service between Naples, Genoa and New York, so that she will be running on practically the route for which she was designed. In connection with this "deal" it has been stated that the Cunard Company are to place in Greenock an order for another vessel for their Mediterranean service, but so far this is not confirmed.

Cunard "Campania" for Clyde Service.—A further result of the close working understanding between the Cunard and Anchor Lines referred to above is that on May 23rd and June 20th the sailings of the Anchor liner *Cameronia* from Glasgow will be taken up by the Cunard liner *Campania*. It is believed that this is owing to a derangement in the machinery of the *Cameronia*, which vessel has been detained in New York for overhaul. The *Campania* is available for the two round trips which the *Cameronia* will miss because of the completion of the *Aquitania*, which will take her place in the Cunard Line services between Liverpool and New York. This transfer of service, temporarily, is interesting in several ways. The *Campania* and her sister ship the *Lucania* were built at the Fairfield Co.'s works in 1893, and they held all the Atlantic records for a good many years. The *Lucania* is now broken up and the *Campania* will, on the occasion of her first trip from Glasgow, visit the Clyde for the first time since she was completed and left the river to take her leading place in the Atlantic service. She will be the largest vessel trading from the Clyde, being of 12,950 tons gross, as compared with the 12,100 tons of the Allan liner *Scandinavian*—the present largest vessel sailing from Glasgow.

Speed Trials.—As usual, the Clyde arena for the speed trials of new steamers, including the measured mile at Skelmorlie, has been well requisitioned during May. Amongst notable steamers tried were the British India liners *Tanda*, built by Messrs Alexander Stephen & Sons, Linthouse, and the *Bamora*, a product of the yard of Messrs. Barclay, Curle and Co., Whiteinch. The latter vessel is similar to four already constructed for the Persian Gulf trade of the Company and to two others of the same class which are being built at present. Another vessel put through her facings was the Lancashire and Yorkshire Railway Co.'s new steamer *Rothen*, built and engined by Messrs. The Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, and another even more notable the twin-screw steamer *Honorata*, a new addition to the fleet of the New Zealand Shipping Co., built by Messrs. William Denny & Bros., Dumbarton, and the largest vessel yet produced at that renowned seat of shipbuilding.

Messrs. McKie & Baxter, Copland Road Engine Works, Govan, have purchased the goodwill, patterns, drawings and templates of the late firm of Messrs. Muir & Houston, Ltd., Harbour Engine Works, Kinning Park, Glasgow. The most recent of the contracts completed by Messrs. McKie and Baxter is the engining of the twin-screw passenger steamer *Robina*, built by the Ardrossan Shipbuilding Co., to the order of the New Central Morecambe Pier Co., Blackpool and the Isle of Man.

Messrs. Bow, McLachlan & Co., Paisley, have lately received from the British Admiralty an order for a twin-screw tug steamer for administration services in connection with the Navy.

The New Irvine Shipyard.—The new shipbuilding works at Irvine being laid down by Messrs. Mackie & Thomson (until lately of Govan), in association with Messrs. Harland and Wolff, Ltd., who have absorbed their Govan premises, are satisfactorily progressing. It has just transpired that Messrs. Mackie & Thomson have agreed to pay the Irvine Harbour Trust a sum of £20 per day for all dredging done for them, together with an advance of £2,000 in lieu of 100 days' dredging, to be undertaken when the firm wish the two acres of ground, known as "The Flats," opposite their new yard, to be dredged to a sufficient depth.

Retiral of Board of Trade Surveyor.—Mr. William Harris, who is well known all over the West of Scotland as principal district officer of the Board of Trade, is due to retire in June at the age limit. Mr. Harris has been in the service of the Board of Trade for thirty-three years. He is a native of Forfarshire, and was trained as a marine engineer in Arbroath. Afterwards he served in the works of Messrs. J. & G. Thomson, Clydebank; Messrs. Robert Napier & Co., Govan, and Messrs. D. and W. Henderson & Co., Glasgow. Later he was chief engineer of the Anchor Line steamer *Ethiopia*. He entered the service of the Board of Trade in March, 1881, and served at Hull, Leith, Liverpool and—for the past ten years—at Glasgow. He will be succeeded in the West of Scotland district by Mr. Thomas Rowley, who is at present senior surveyor at Liverpool, and who went from the Clyde to that port.

THE TYNE AND WEAR.

(From our Own Correspondent.)

The Tyne.

No decision has yet been arrived at in regard to the much debated question of laying up ships to force up the price of freights. The topic is still being discussed with as much warmth on the other side as on the part of its advocates, but it has reached the stage of a special committee of the British Shipping Federation, which is to report on the practicability or the desirability of the scheme, or both. Shipbuilders who were at first sceptical as to the influence of this movement are now not so ready to scout its bearing on the trade of the river, because it is obvious that if shipowners begin to lay up tonnage the keenness of the demand for new bottoms will be ended. Still there is so much work on hand that builders are not unduly alarmed for their prospects for some time to come, and they are under the impression that the market for freights may right itself in time to give them more work when they have executed the orders they have in hand.

Some disappointment has been experienced at the decision of the steelmakers to reduce the price of steel plates for foreign consumption by 10s. a ton and leave them for home consumption at the present figure, but coal owners declare that if they are to pay any more expenses through the action of the legislature the making of plates and the manufacture of iron will both come under the category of trades that cannot make headway against the foreign competitor. The reduction of price to the foreign consumer appears to be a set off to the inroads the German makers are making in the English market. German steel plates are being steadily imported by Tyne builders, and it is said steel billets and German shafting are coming into this country at prices the English makers cannot quote.

The Tyne has its connections with many ports, the most recent vessels launched from its banks being for that disturbed quarter of the world, Mexico, and for the trade of those centres where fighting is going on most vigorously. Messrs. Fitzgerald have made good progress since they opened their new yard at Willington Quay, and have already cleared off two of the vessels whose keels were laid three short months ago, one being for the Mexican Eagle Oil Company, a tug for handling the big oil-tankers at Puerto, Mexico, and the other a trawler, which is the fourteenth built for the local fishing fleet of forty owned by Messrs. Hastie & Sons.

At Messrs. Palmer's yard at Jarrow, work is still proceeding and will be for the next nine months, on the battleship *Resolution*. In addition to the large passenger vessel I noted last month, they have just secured an order for extensive alteration and additions to the s.s. *Seti*, which the Russian Government has purchased from the Moss Line, and which is to be adapted for Admiralty purposes.

Messrs. Palmer & Company, of Jarrow Works, have been fortunate in securing the contracts for one of the two battleships in the 1914-15 programme. One of the contracts has gone to the Fairfield Company on the Clyde, and Messrs. Palmers have got the other. Messrs. Palmers, as stated above, have been busy for some time on the battleship *Resolution*, and have also two destroyers in hand, the *Murray* and the *Myngs*.

This fulfils what was anticipated last month that some fresh Government orders for the Tyne would come to hand. May has been a very quiet month in respect to new orders generally. Launching has gone on steadily, and none of the builders can complain of any scarcity of work, but there has been a decided lack of new orders.

There have, it is said, been enquiries by the Russian Government for small motor-boats of about forty feet in length, to be used in a State-aided service in the development of the Russian fisheries, and for a class of work of this kind it is most likely that the neighbouring port of Blyth will secure any orders. One Blyth firm has already received an order for a forty-foot Kelvin motor-boat for service on the Tyne, and a large motor pilot-boat for service with the Hartlepools Pilotage Commission. Blyth is, however, coming to the fore with bigger work. The Blyth Shipbuilding and Dry Dock Company have just laid, a few weeks ago, the keel of a vessel 370 ft. between perpendiculars, with a beam of 51 ft., and a deadweight of 7,000 tons, for the Huddart Parker Steamship Company, of Melbourne, and, as the firm have also some orders for hydroplanes for the British Government, the little port may be considered to be quite busy.

The firm of Messrs. J. P. Rennoldson & Co., engineers and shipbuilders, of Wapping Street, South Shields, has just been turned into a limited company, the first directors being Mr. Jos. M. Rennoldson, J.P., chairman of the Company, Mr. Charles Ross and Mr. Jos. M. Middleton. The business was established so far back as 1826. It is to be known as J. P. Rennoldson & Sons, Ltd.

All the berths at Elswick Shipyard are full, and the new yard at Walker being now within reach of completion, enables Messrs. Armstrong, Whitworth & Company to take orders at which they might have hesitated if they had to build above low bridges. They have secured an order for the big Brazilian "Dreadnought" which is to replace the *Rio de Janeiro*, sold to the Turkish Government. They have also secured, in conjunction with Messrs. Vickers, of Barrow, the contract for two Turkish warships. The exact dimensions of these vessels have not yet transpired, but it is said the vessel to be built at the new Walker yard will be in the neighbourhood of 30,000 tons, and that will give the Turks the biggest warship built on the Tyne. These vessels form part of the reconstruction scheme of the Turkish Navy.

Altogether, there is a very large amount of naval work in progress on the Tyne. There are now eleven war vessels in course of construction, and something like sixty to seventy cargo boats.

The month of May, to be exact, the 19th, was the hundredth anniversary of the first steamboat used on the Tyne for commercial purposes. This vessel belonged to The Tyne Steam Packet Company, and carried passengers, etc., between Newcastle and Shields. She was afterwards named the *Perseverance*. This interesting fact is recalled by a letter written to the "Newcastle Daily Chronicle" by Mr. Frank T. Turner.

The Wear.

The output of the Wear continues to increase, if not in the number of vessels, at any rate in their deadweight. Messrs. Doxford & Sons are busy on oil-tankers for the Russian Government, and have still to complete several important turret boats for cargo carrying.

Messrs. Geo. Clark Ltd., of Southwick, have during the month sent to sea two of the boats I mentioned among the half-dozen they had in hand last month. The *Dykland* is one of the new vessels they have finished, and the *Pinewood*, for Messrs. Fenwick, of Sunderland and London, has now been sent to sea. The engines are in the *Sinsen* and the *Belridge*, now lying by the quay, but not quite finished, and they have nearly completed work on the *Ioonatis*, a steamer built for Greek owners.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard.—It was expected that this firm would have secured the contract for a cargo steamer for Messrs. Huddart Parker Proprietary, Melbourne, but the order has gone to the Northumberland Shipbuilding Co., Howdon-on-Tyne; the machinery will be supplied by Messrs. Richardsons, Westgarth and Co., Ltd., Sunderland.

Messrs. Constantine, Pickering & Co. have sold the s.s. *Puritan*, 4,038 gross tons, through Messrs. C. G. Ashdown and Co., to Japanese owners for about £18,000.

Messrs. W. Harkess & Sons, Ltd., report nothing new during the month, though they are busy on both old and new work, sufficient to keep them well employed for some time yet.

Messrs. Smith's Dry Dock Co. are building, repairing and overhauling a vast amount of tonnage. No new orders are reported during the month.

Messrs. Richardson, Westgarth & Co., Ltd., have a large amount of boiler orders on hand, both for land and marine work. It was reported they were likely to secure the order for the machinery for the Tyne-Tees Shipping Co.; the order, however, has been placed with the Wear branch of this firm. The boat will be built by Messrs. S. P. Austin & Co., also of Sunderland.

Stockton and Thornaby.

No new orders are reported from any of these yards, though it is rumoured an order has been placed. Enquiries, however, are falling off for tramp tonnage, and competition is very keen.

Messrs. Blair & Co. are reported to have secured the contract to build the engines and boilers for a cargo steamer to be built locally, presumably the one referred to.

West Hartlepool.

Messrs. Furness, Withy & Co. have sold the s.s. *Cynthiana* of 3,185 gross tons to the West Russian Steam Navigation Co., who have renamed her s.s. *Egret*. The Neptune Steam Navigation Co. (Messrs. Furness, Withy & Co., managers) have sold the s.s. *Malvern Range*, 3,573 gross tons, to Russians, and Messrs. Furness, Withy & Co.'s s.s. *Persiana*, 3,150 gross tons, to Russians for about £28,000. The West Hartlepool Steam Navigation Co., Ltd., have sold the s.s. *Edenhall*, 2,573 gross tons, to Messrs. Michalinos & Co., London, through Messrs. H. E. Moss & Co. for about £14,500. The North of England Steamship Co. (Messrs. Crosby, Magee and Co., managers) have sold the s.s. *Bainbridge*, 1,900 gross tons, to Norwegian shipowners.

Messrs. W. Gray & Co. are very busy at both the old and new yards. Owing to persistent rumours that they had to close the old yard, Sir William Cresswell Gray has publicly announced that such is not the case, and that the construction of the new yard on the Tees for the largest of ships is due to the inadequate facilities at the ports of the Hartlepools, and that the extensions taking place at their Central Marine Engine Works are to enable them to cope with the increased amount of work which it is expected they will turn out. At the present time they are full up with orders for new tonnage.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are engaged on the orders recently placed by Sir

Stephen Furness, and which will keep them busy well into next year.

The Central Marine Engine Works of Messrs. W. Gray and Co. are busy in every department, both marine and specialities. Preparations are being made for the construction of a very large bay for the boiler shop, a bay of which will be allotted to the extension of their erecting shop. New machinery is being bought to cope with the very heaviest of marine boilers.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton Yard, are making great progress with the British Empire Transport Co.'s boats placed with this firm by Sir Stephen Furness. No new work is reported, but enquiries are fairly numerous, and it is expected they will secure an order that is in the market for delivery next spring.

Messrs. Richardsons, Westgarth & Co., Ltd., have all the ships to engine that were placed with Messrs. Irvine's for the British Empire Transport Co. They have orders for condensing plants and marine specialities which will keep them busy for twelve months to come.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull Docks.—There has been a great amount of tonnage arriving lately from all parts of the world, and the largest sailing-ship, belonging to Germany, a five-master with auxiliary machinery—*R. C. Rickmers*—has discharged a very valuable cargo of Soya beans from the Far East. A great number of steamers from Australia and New Zealand, with wool and fruit, have also discharged at Hull. The s.s. *Ronald*, Norwegian steamer, has arrived from the Southern seas, with her tanks full of whale oil; this is the first arrival of a number of steamers bound to Hull with sperm oil. The Railway Companies have sent out about 3,000 invitations for the opening of the new joint dock by the King and Queen on the 26th May. This will be a great day for Hull; there will be about 1,500 soldiers drafted to the City, besides 500 policemen from other cities. The water area is 53½ acres, and consists of a main dock 1,000 feet long by 1,050 feet wide, and two arms, the north-west 1,356 feet by 325 feet, and the north-east 1,350 feet by 450 feet. There will be a total length of quays of 8,162 feet. Extensions will be made later, enlarging the water area to 83 acres.

Immingham Dock.—The records for quick loading at Immingham Dock are changing from day to day. On the latest occasion an average of 590 tons per hour was maintained. This, we believe, constitutes a record for the whole of the Humber ports. The s.s. *Riding* commenced loading at 10-25 a.m., and finished at 2-50 p.m., during which time she took on a full cargo of 1,722 tons of coal and fifty bunkers. There was an unavoidable delay for moving the vessel during the operations, making the nett time for loading the cargo 2 hours 55 minutes. This gives an average of over 590 tons per hour. Messrs. Newton, Chambers & Co., Ltd., Hull, were shippers of the coal. Great credit is due to the Great Central Railway Company, and all concerned, for this fine performance.

Fire at Alexandra Dock, Hull.—A fire broke out on the Alexandra Dock on the 17th May amongst the mining timber stored on the dock. Several steamers and lighters were removed out of the zone of the fire, which raged for a couple of hours. The Fire Brigade turned out with all haste, and received the aid of the steam-tug *Hull*.

Wilson Line Marine Superintendent.—Lieut. H. Lavington Walton, R.N.R., who has been appointed Marine Superintendent of the Wilson Line, in succession to the late Commander Cowlrick, R.N.R., entered upon his new duties on the 18th May. The new superintendent commenced his sea career in sailing vessels, and joined the Wilson Line about eleven years ago as Second Officer, and has since served in most of the Wilson Line passenger ships. As Chief Officer he has served in the *Ariosto*, *Oslo*, *Bayardo*, *Aaro* and *Eskimo*, his last steamer being the R.M.S. *Salmo*, in the Grimsby-Gothenburg mail service, which he commanded for fifteen months. Lieut. Walton has also served for twelve months in the Navy, sailing in the H.M.S. *Bedford*, which was attached to the Second Cruiser Squadron, commanded by Prince Louis of Battenburg; he is a Lieutenant in the Royal Naval Reserve, and has gone through gunnery, torpedo and signalling courses. He sailed with Prince Louis when he made a State visit to the United States and Canada in 1905.

A Presentation.—A presentation was recently made at the offices of the Hull Central Dry Dock Co., Ltd. The recipient of the presentation was the genial manager, Mr. Charles Hall, who is well-known by shipowners and superintendent engineers, and was made on behalf of the shareholders to mark the completion by Mr. Hall of twenty-five years' connection with the firm. The presentation, which consisted of a large silver centre-piece for the table, accompanied by a silver coffee pot, vases and two centre dishes, was made by Mr. J. A. Brown, in the presence of a large company. Mr. Brown remarked that the event of any gentleman occupying a position for twenty-five years, and enjoying the thorough good-will of the Directors of the Company, the esteem of the shareholders and the confidence of the customers, was a combination of happy circumstances any man might be proud of. Mr. Hall, in suitable terms, acknowledged the gifts.

Hull Central Dry Dock, Ltd.—This well-reputed firm seems at all times to have plenty of good business. A great amount of tonnage has passed through their books during the month.

Messrs. C. D. Holmes, Ltd., engineers, boilermakers and ship repairers, are booked up with orders for machinery and boilers for trawlers and coasters well into next year. Machines are working night and day to compete with the orders, and the outside staff is kept busy with general repair work.

Messrs. Cooper & Co., Ltd., engineers and shipbuilders, have had an exceedingly busy month with repair work, both at their engine works and branch shop, Alexandra Dock. The firm's graving dock has enjoyed a prosperous month, and is well booked up, and the moulding shop is kept very busy with casting new patent propellers for home and export.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are well booked up with orders for boilers and machinery for trawlers, coasters, etc., and general repair work.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have been engaged during the month on the following steamers:—s.s. *Aden*, s.s. *Algeiba*, s.s. *Swanbridge*, s.s. *Rudmore*, R.M.S.P. *Pardo* and tug *Winchester*. S.s. *Aden*, engine and deck repairs, s.s. *Algeiba*, s.s. *Swanbridge*, s.s. *Rudmore*, usual repairs. R.M.S.P. *Pardo*, insulation repairs in holds, etc., tug *Winchester*, new funnel, etc.

Thomas Tate, engineer and boilermaker, Clarence Engine Works, repaired the following steamers during the month:—s.s. *Pert*, new tail-shaft fitted, stern tube rebushed, boiler opened out for survey; s.s. *Taffy*, s.s. *Spurn Point*, general engine-room repairs; s.t. *Mystic*, new steering gear fitted, etc.; tugs *John Blakey*, *Excelsior*, *Tyre*, general engine-room repairs; several coasting steamers have also been in for repair.

Messrs. Stewart & Craig, engineers and ship repairers—General repairs have been effected on the s.s. *King David*, s.s. *Don Cesar*. The sailing-ship *Westfalen* has gone through extensive repairs and Lloyd's Survey, and has also been in graving dock.

Messrs. Woodall & Co., engineers, have had a good run of repair work on coasting steamers and several Swedish steamers. Work has also been going on at the Hull Corporation Tram Depot on boilers and engines, overhauling, etc. The smithy is very busy with forgings for the L.C.C. and forgings, such as sterns and rudder posts, for several small shipyards.

Fish Dock.—The several engine shops around the dock are busy amongst the trawlers, doing general repair work, and opening out boilers and engines for Lloyd's Surveys. The N.E. Railway's patent slips are fully employed for hull examinations and tail shafts. A number of contracts for new trawlers have been given out.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are well booked up with orders for trawlers, and, having so much work on hand, have sub-let an order for a sister-ship to the French trawler *Maroc* to Messrs. Earle's Shipbuilding Company to build for them.

H. Scarr, shipbuilder, Hessle, Hull, has orders for large steel lighters for local owners, gas buoy vessels for the Humber Conservancy, and a steam water boat for Hull Docks.

Messrs. Livingstone & Cooper, Ltd., shipbuilders, Hessle, Hull, will soon be launching three Yarmouth drifters, which will be engined by Messrs. Crabtree & Co., Ltd. This firm has booked two large steamers for the Iceland trade, to have large engine power, and to be built greatly in excess of Lloyd's requirements. Prospects are good; they possess up-to-date tools and machinery to push ahead with work.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Southampton.—The R.M.S.P. Company's new South American mail steamer *Alcantara* is nearing completion, and she is to commence her maiden voyage from this port on the 19th of this month. She is the seventh "A" class steamer, and has a gross register tonnage of 15,700, which is nearly 700 tons greater than the *Arlanza*, which was the first steamer of the fleet to be fitted with "Combination" machinery. An eighth vessel, the *Almanzora*, is well advanced. Considerable anxiety is prevalent here as to the allocation of the twelve destroyers comprised in this year's programme. Tenders were to be with the Admiralty by the end of last month. Ten of the vessels are understood to be similar to thirteen of the fifteen vessels of last year's programme, whilst two are to be larger and higher-powered vessels.

The 15th of last month was a very busy day for the local agents of the Hamburg Amerika Company (Messrs. Smith, Sundius & Co.), who had the *Vaterland*, *Kaiserin Auguste Victoria* and *Cincinnati* in the river. The total tonnage of these vessels amounts to nearly 100,000 tons. The latter vessel sailed on the Boston service, which is thus re-established at this port. She is to be joined by the *Cleveland* and the *Amerika*. Southampton has seen the last of the White Star liner *Majestic*, which has been purchased by Messrs. Ward, of Sheffield, for breaking-up purposes.

A Record Coaling Feat.—The *St. Louis*, of the American Line, made a very quick passage from New York, arriving here on the 15th of last month, *i.e.*, Friday. The Company were under contract to land 800 Norwegians in Christiania on the Sunday morning to enable them to be present at the opening ceremony of the national festival. To enable the vessel to proceed to Norway and return necessitated her taking 1,000 tons of coal into her bunkers. This quantity was duly put aboard in four and a half hours by the Rea Transport Co., Ltd., and the vessel was away again within six hours of her arrival. The arrangements were in the hands of Mr. W. G. Jones, outdoor manager for Messrs. Rea.

Repair Work.—Some time ago the U.C. Company's steamer *Dover Castle* was in trouble off Port Elizabeth. She proceeded home under her own steam and was dry docked about the middle of last month for examination. The damage proved to be much more serious than was anticipated, and it is understood the work of repair will occupy about three months. There is at present a great slackness in repair work, and it is to be hoped that a local firm will be successful in securing the contract, but, in view of the keen competition which is sure to be encountered from the north-east coast firms, this desirable consummation seems rather remote. Messrs. Harland & Wolff have been sharing in the local depression in ship repairing, but this month and next promise to be very busy months for them. The summer overhauls commence and dry docks have been booked for the White Star and American Line boats, also the *France*, of the French Transatlantic Company, which has been rather a frequent visitor here, has been booked for docking and repair. A good deal of internal work is required on some of the vessels.

Since writing the above note we understand Messrs. Harland & Wolff have been successful in securing the contract to repair the *Dover Castle*.

Messrs. J. I. Thornycroft & Co., Ltd.—H.M. ships *Victor*, *Lance*, *Lookout*, *Meteor* and *Mastiff*.—The trials of H.M.S. *Victor* are completed, and she will shortly be delivered. The *Lance* is preparing for trials, and the *Lookout* was launched at the end of April. The first of the twin-screw tugs for the Argentine Navy will be launched about the middle of this month. A twin-screw motor yacht has completed satisfactory trials and will be delivered shortly. She has been built to the order of H.I.H. The Grand Duke Cyril of Russia and is named *Melita*. An order has been received from the Russian Ministry of Ways and Communications for two twin-screw steamboats to be shipped in sections. Several motor-boats have completed satisfactory trials during the past month, and several orders have been received. A considerable amount of general engineering work has gone through the shops, in addition to the machinery for vessels in hand. The Repairs Department have been fully occupied with work on vessels of various types.

Messrs. Day, Summers & Co., Ltd., Northam Iron Works.—The s.s. *Towy*, the first of three sister vessels for the Royal Mail Company's intercolonial service, arrived safely at St. Lucia on the 15th of last month, the voyage having been made in twenty days. As these notes go to press the second vessel, s.s. *Taff*, is running her official trials. Several steam yachts and pleasure steamers have been on the slip during the past month. The s.y.'s *Madrigal* and *Rhodora* have also been slipped and painted.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Work has been commenced on the British torpedo-boat-destroyer of the "Leader" class, and a further 200 h.p. seaplane has been delivered to the Naval Authorities. Sundry steam and motor pinnaces have been delivered, and the engine works and shipyard continue busy on various contracts.

THAMES.

(*From our Own Correspondent.*)

Shipping Companies.—The Royal Mail Steamship Co. has issued its annual report for 1913, in which it is stated that the various services, notwithstanding competition, have been well maintained. The ordinary dividend is the same, *viz.*, 6 per cent., though there is not quite the same total available. The "A" steamers in the South American mail service will shortly be strengthened by the *Alcantara*, which leaves Southampton on the 19th inst. for Brazil and the River Plate, and another vessel of same type named the *Almanzora* is under construction by Messrs. Harland & Wolff. Two vessels for the West India service are being built by Messrs. Workman, Clark & Co. They will be named *Essequibo* and *Ebro*, and will be ready towards the end of the year. Another branch of the Company's activities is the Shire Line to the East. Two new steamers have been added here, two other bought and three new ones arranged for. Some of these vessels proceed across the Pacific to Vancouver and other ports. A new departure by the Company is a line from Canada to the West Indies, and vessels have been acquired for this route in addition to others already owned by the Company. The Company's fleet now totals 342,667 tons, while those of other Companies closely affiliated to it amount to 1,404,041 tons, making an aggregate of 1,746,708 tons.

Another Company to issue its report is the British India, and this states that after liberal provision for depreciation there is an available balance, including £15,583 brought in, of £146,386. A dividend is proposed of 5 per cent. on the preference stock and 7½ per cent. on shares, besides a special bonus to the latter of 2½ per cent., carrying forward £15,666. There was a delay in getting new steamers so that none of the vessels promised for last year were received, but since December four have come to hand and four more will be ready by now. Three vessels have been acquired by the Company and orders have been given for nine more steamers for delivery during the next twelve or eighteen months. The directors state that the results of the current year so far have been good.

The Port of London.—At the annual meeting of the London Chamber of Commerce mention was made by the chairman, Lord Southwark, of the work being done by the Port Authority to make the port second to none in the world. The tonnage of shipping had now reached the figure of 30,747,854 nett register, while attention was drawn to the new dock and the cargo jetty at Tilbury. The contracts will run into over £5,000,000 for the works, which include a new dock of 65 acres to the south of the Albert Dock. Steps are being taken by the Authority to form a permanent labour staff of 3,000 men, who will be supplemented by others holding preference tickets.

The Thames Steamboats. — The question of a public service of boats for the Thames is, we understand, to again

come before the Council. A petition with 10,000 signatures has been prepared asking that pier dues on the steamboats should be abolished, it being claimed that these dues make the service impossible for private enterprise. The managing director has written to the Council pointing out that for some years he has had to run the boats at a loss.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

Messrs. Cammell, Laird & Co.—The first of the two 500 ft. steamers now building for the Embiricos interest at the yard of Messrs. Cammell, Laird & Company is expected to be launched in June. These vessels will be named *The Vassilefs Constantinos and Vassilissa Sophia*, after the reigning King and Queen of Greece. A unique feature in both these vessels will be the little church fitted on board. Tiny altars will be provided, whilst the walls will be adorned with ikons and other decorations associated with all eastern churches. The congregation will be grouped amidships, thus having a full view of both altar and priest. A large brass bell will denote the hours of service. On May 12th, the t.s.s. *Cuidad de Buenos Aires* was launched by Baroness Mihanovitch. This vessel, the first of two now building for the Argentine Navigation Company, is intended for the cross-channel night service between Buenos Aires and Monte Video, and is propelled by two sets of Parsons compound geared turbines, the high pressure being placed in the centre, and the low pressure in the wings of the vessel. The high-pressure rotor is of forged steel, in one piece, whilst the low-pressure rotors have forged steel drum, forged steel spindle, and cast steel wheel. All forgings have been made at the builders' Sheffield works. Manœuvring valves, with flexible discs, are fitted, also throttle valves with Broell's governors. Steam is supplied by four single-ended boilers fitted with Howden's forced draught, one boiler being fitted for burning oil fuel or coal, as desired. Other new features are the Michel thrust blocks, which, running practically on a film of oil, are capable of taking an enormous pressure per square inch, and are thus comparatively small. The main dimensions of the vessel are :— Length over all, 364 ft.; length between perpendiculars, 350 ft.; breadth moulded, 44 ft.; depth to awning deck, 23 ft. 3 in. A sea speed of 18 knots is expected upon a draught of 10 ft. These vessels are amongst the most luxuriously fitted up vessels in the world, and will carry 494 first-class and 268 second-class passengers.

Munificent Gift by Liverpool Shipowner.—Mr. John Rankin, of the well-known firm of shipowners, Messrs. Rankin, Gilmour & Co., of Liverpool, has given £10,000 for the relief of retired mercantile officers or their widows. The announcement was made by the Lord Mayor at the annual meeting of the Mercantile Marine Association. The Association will have the control of the fund, preference being given to those who have been connected with Liverpool ships. This same public-spirited shipowner recently offered to place one of his vessels at the disposal of the Dock Board members to enable them to visit the various Continental ports to inspect the various facilities for berthing and discharging vessels.

The Manchester Ship Canal.—It is reported that several firms have been inspecting sites for works near Irlam. Amongst these firms might be mentioned Liverpool timber merchants, Bradford engineers and Leeds clothing firms.

Liverpool University.—Mr. J. Wemyss Anderson, M.Eng. (Liverpool), M.Inst.C.E., M.I.M.E., has been elected to the position of Lecturer in Refrigeration at the Liverpool University. Mr. Anderson at present is Lecturer in Engineering Design and Drawing and Dean of the Faculty of Engineering.

Death of a Liverpool Engineer.—Mr. Joseph Healey passed away on the 18th of May at Grassendale. Mr. Healey, who was at one time in the White Star service, carried on business in Garston as an engineer and ship repairer for the last forty years, and was well-known and respected in Garston's industrial circle.

The Isherwood System.—In the steamer *Frank H. Buck*, built for the Associated Oil Company by the Union Iron Works of San Francisco, a new era has been opened for this system, since this vessel is the first of the type to have been built on the Pacific coast. This vessel is 426 ft. 9 in. long, 55 ft. 4 in. beam, and 31 ft. 8 in. in depth, with a draught of 27 ft., having a displacement of 14,000 tons, and a carrying capacity of 62,000 barrels of oil in sixteen tanks. She will have a speed of 11 knots and a horse-power of 3,000, and is the first vessel to be built in competition with the East since the earthquake.

Colegrave's Boat-lowering Gear.—This gear, which was described in our issue of August, 1913, has, it is understood, been selected by the White Star Company for the equipping of their vessels. It has been decided to depart from the original design and to place these winches upon the decks instead of the davits. The Isle of Man Steam Packet Company have also decided to fit some of their steamers with the davit type of this gear. Messrs. Bullivant & Company are the sole makers.

The Londonderry Shipyard.—Labour unrest has soon manifested itself in this newly re-opened yard, and but for a timely settlement of the differences, a recently-revived industry might have been again lost to the town, after having been closed down for twelve years. At the time of writing the men have resumed work pending a final decision of the directors.

The Liverpool Engineering Society.—At the annual meeting, held on April 29th, Mr. F. E. Cooper (President) in the chair, a successful session was reported. The Lord Derby Gold Medal was awarded to Mr. T. C. Tobin, M.I.N.A., for his paper on "The Weight Factor in Merchant Ship Design." The society's premium was divided into two between Mr. W. Mason, M.A., and Mr. E. J. Rimmer. Mr. E. C. Given, M.Inst.C.E., M.I.M.E., M.I.N.A., was elected President, with Prof. E. W. Marchant, D.Sc., M.I.E.E., and Mr. A. Hope, M.Inst.C.E., M.I.Mar.E., as Vice-Presidents.

Messrs. H. & C. Grayson.—This firm launched from their Garston yard, on May 9th, the Trinity House lightship No. 80. This vessel, which was christened by Mrs. Inch, wife of the yard manager, is 104 ft. long, 26 ft. beam, depth 15 ft., with a gross tonnage of 300. The construction is of iron, since steel corrodes so speedily, and has been constructed under the supervision of Mr. Frank C. Goodall, naval architect and surveyor to Trinity House. The special feature of the design is that the ship is practically unsinkable. A crew of eleven men can be carried, whilst a powerful illuminant and fog-horn will be fitted. The vessel will be completed towards the end of June.

The Allan Line.—On May 8th, the *Calgarian* left Liverpool on her maiden voyage to Quebec. The *Calgarian* is exactly similar to her sister vessel, the *Alsatian*, except in the decorations. These vessels are 600 ft. long and have a gross tonnage of 18,500. Prof. J. H. Biles and Dr. G. B. Hunter were amongst those on board going out to Canada.

The Cunard Line.—The event of the year in the Mersey has undoubtedly been the arrival of the *Aquitania* early on Thursday morning, May 14th. Merseysiders awoke to find the giant vessel lying at anchor off New Brighton, and a splendid view of her massive proportions was obtained from both sides of the river. Due to a strike amongst the Cunard shore workers, which, however, was soon settled by the Company granting a forty-eight hour week, docking did not take place in the Gladstone Dock until the afternoon tide on Friday, the 15th. This was safely performed, and the work of painting the hull and completing of the decorations, etc., proceeded apace prior to the vessel's maiden voyage on May 30th.

Birkenhead's Milling Industry.—The Mersey Docks and Harbour Board have leased, for a long period, six acres of land adjoining the Birkenhead Docks to the great Cardiff milling firm of Messrs. Spillers & Baker. On this site this Company intend to erect a large flour mill as a branch of their present works. This Birkenhead industry is at present the second largest in the world, and, with this addition, will range the largest in Great Britain.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—The past month has passed away with some feelings of gloom, because of the indications which have been presenting themselves of an approach to quieter

times in the shipbuilding and engineering trades, but before the month was out news came of the order for a second super-Dreadnought from the Imperial Ottoman Government which has been placed with Messrs. Vickers at Barrow. It is known, of course, that Messrs. Vickers and Messrs. Armstrong have jointly received a concession from the Turkish Government to renovate the Turkish Navy, and with that view have come into possession of a shipyard near Constantinople which they are modernizing and bringing up to date with the view of building there, not only warships, but commercial ships as well, and also with the object of modernizing existing warships which are considered of sufficient value to be fitted up with more powerful equipment, so as to be ready to be employed by Turkey in any wars she may essay to enter into. Before she can bring this new yard into operation for effective purposes it is necessary she should get possession of warships to be able to face a possible enemy at the moment. She therefore gave out the order for the super-Dreadnought *Reshadieh* to Messrs. Vickers, and later on bought the *Rio de Janeiro*, building for the Brazilian Government at Armstrong's on the Tyne, and now when these two vessels are almost ready for delivery Messrs. Armstrong and Messrs. Vickers have received orders to build each a super-Dreadnought of even greater fighting power than the *Reshadieh*. The dimensions of the new vessels are for the moment a secret, but there is reason to believe they will come up to the size and calibre of the most recent British Dreadnoughts. These orders will help very materially to dispose of any gloomy thoughts of the quieter times which many people believed were coming over the shipbuilding and engineering trades. Many departments in the Vickers' yard were beginning to slow down through want of orders. Now there is to be a rush in the building of the new ship, and already work has been begun on the ways on which the vessel will soon be built.

Other Orders.—Messrs. Vickers have also been commissioned to build the engines of a second *Earl Grey*, an ice-breaker built at Barrow a few years ago for the Canadian Government. The vessel will be built by the Canadian Vickers, Ltd., and when her engines are finished they will be sent over to Canada to be fitted in the new ship. There is also a new floating dock to be built in France for the Turkish Government, and it is reported her plates and other material will be supplied from the Vickers' works at Barrow. The Barrow builders have had experience in the building of huge floating docks, and the French firm has had no such experience. It is doubtless owing to some financial arrangements Turkey has had with France that some of the work of resuscitating the Turkey Navy falls to the lot of our neighbours across the English Channel.

There is evidently to be a great revival in the business of adding submarines to the Navy. The work in the submarine department in Barrow is so great and plentiful that the firm have decided to increase these works so as to cope with the greater programme of new construction which is more than likely to come their way. At present several submarines of the "E" class are building at Barrow, and at least other two of this class of vessels has to be laid down when the present vessels under construction have been launched, but most interest is being taken in a special experimental submarine which is being built, which for size and power and facilities of destruction of an enemy far exceeds anything which has yet been designed or built. The size of submarines has been increased to a very considerable extent of late, and this has necessitated the extension of the submarine sheds in the Barrow yard. At present there are five bays in this department, and the work is in progress for adding another couple of large bays to it. It goes without saying that the experience the Vicker's firm has had in the building of submarines places them in a very high position with the Admiralty, and it is confidently expected that in the new orders which have to be given out Barrow will come in for a large share of them.

Work in Progress.—Very great attention is being given to the work of fitting up the Turkish super-Dreadnought *Reshadieh*, which is to be finished in August. The Turkish Government are very anxious to get early delivery of this vessel, for the purpose of keeping the peace in the Mediterranean, and all the available men are employed on her to get her completed at as early a date as possible. Almost similar activity is observable on the super-Dreadnought the *Emperor of India*, which it is hoped to deliver to the Admiralty by the end of the present year, In the shipbuilding yard the launch of the *Penelope*, one of the two light cruisers building at Barrow for the Admiralty, may be expected at an early date. Good progress is being made with this vessel and her sister ship *Phaeton*. Substantial progress is observable with the British super-Dreadnought *Revenge*, which is lifting her sides very satisfactorily. There is, however, a scarcity of men in the shipyard departments, and progress is not, therefore, so great as it ought to be. The demand for men will be increased when the airship sheds have been completed, as this new department will employ from 800 to 1,000 workmen.

Demarcation Disputes.—Satisfactory arrangements have been made to prevent strikes or lock-outs from taking place at Barrow in the case of demarcation disputes. The engineers have already agreed with these arrangements and the boilermakers are considering the proposals, with every likelihood of their acceptance. It is proposed to form a board representative of the men and the masters, together with the different Unions, with a chairman appointed who is not connected with the Company. When a difficulty occurs the management will be called upon to make a settlement of a temporary character. If this is not to be a permanent settlement, the board will confer and come to an arrangement which is to last for twelve months. In the meantime there is to be no stoppage of work if any difficulty arises.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff. The Royal Mail Steam Packet Company's magnificent triple-screw liner *Alcantara* is receiving her finishing touches and will be ready for sea early in June. The fitting out of the Aberdeen liner *Euripides* is also being pushed forward rapidly. As regards the big White Star liner *Britannic*, whilst in the eyes of the casual observer she may not appear outwardly much further forward since her launch, yet an enormous amount of work has been done inside, and the great bulk of her machinery installed. It will, of course, be a long time before she is ready for service. The Cunarder *Aquitania* has been referred to in most newspapers as "Britain's biggest ship," but according to the dimensions given in a contemporary she is 5 feet short of the *Britannic* between perpendiculars, whilst her gross tonnage is 3,000 less than that of the White Star boat. Messrs. Harland & Wolff are still suffering from a dearth of hands, the results of which are obvious to anyone going through the yards; during the past two or three months work on the vessels on the two outer slips at the south end has been almost at a standstill. Messrs. Harland & Wolff have a tremendous amount of tonnage in hand, both at the Queen's Island and in their Clyde yard. In the latter place they have an Atlantic Transport liner under construction, which is to be propelled by Diesel engines.

Messrs. Workman, Clark & Co. have recently completed and sent to sea the Hall liner *City of Vienna*. The *City of Exeter*, a larger vessel for the same branch of the Ellerman Lines, will be ready for her trial trip in a week or so. Their biggest repair and overhaul job at present is the Lamport and Holt boat *Verdi*, whose prospective arrival was referred to in last month's notes. As in the case of the *Voltaire* and *Vasari*, in Messrs. Harland & Wolff's hands, refrigerating machinery is being installed. They have also docked the Ulster Steamship Co.'s *Dunmore Head* for painting and minor repairs.

Messrs. MacColl & Co. have a considerable amount of new work in hand, in addition to which they have recently drydocked the steamers *Caerloch*, *Retriever*, *Helen Craig* and *Balniel II.*, and have carried out the annual overhaul of the machinery of the Antrim Iron Ore Company's steamers *Glendun* and *Glenravel*.

Londonderry.—The recent strike in the North of Ireland Shipbuilding Company's yard, which threatened to end disastrously if persisted in, has fortunately been settled. The Company would not, and rightly so, agree to pay the big increase in pay demanded by the labourers and platers' helpers. The crisis was reached when the shipbuilders—completely hung up with the fitting out of the *San Francisco* and other work—decided to remove the vessel from the port.

Further negotiations were then entered upon, with the result that modified terms were put before the men. Wiser counsels prevailed and the masters' offer was accepted. By nature of its isolated position, Derry has, during former tenancies of the yard, suffered very seriously through labour troubles, and it would have been exceedingly regrettable if this strike had proved to be the thin edge of the wedge to eventually drive the present occupants of the shipbuilding premises away from the port. Shirt-making, which is the staple industry of the city, provides work for a large number of women and girls, but the want of employment for men has been a great disadvantage; it therefore behoves the workmen to do their share in fostering the new shipbuilding enterprise.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff, Barry and Newport.

THE amount of business dealt with in South Wales ship-repairing establishments during the past month has been of a satisfactory character, especially when considered in conjunction with the circumstance that this period of the year is generally regarded as the off-season, the latter name being derived from the fact that with the smoother running seas now prevalent naturally a smaller crop of damage repairs comes to hand. However, even in the so-called off-season sometimes the unexpected turns up, and so a good amount of business was moving at the principal ports. A general belief obtains that the usual period of quiet trade will not this year be felt so acutely, as many shipowners are arranging to have their tonnage overhauled now that freight rates have fallen to levels which leave a very small margin of profit. During the period when freights ruled at a high level all non-necessitous repairs were deferred so that tonnage could be kept in constant employment, and it is now anticipated owing to these overhauls being put in hand that the quiet period will be tided over in a very satisfactory manner for the repairing establishments. Most of the jobs, therefore, being of the survey or general repair type, do not loom so largely as would be the case with heavy damage repairs, but nevertheless have been sufficient to keep all the principal establishments well engaged.

Mountstuart Dry Docks, Ltd.—This progressive Company continued to be well engaged during the month both in their dry docks and at the jetty, and at the time of writing there is no outward appearance of any falling-off in business. Such a state of affairs reflects the highest credit not only on those in supreme control, but also on those responsible for the carrying out of the work involved in the various branches of the contracts dealt with. It is one thing to obtain work for an establishment and another thing to be able to retain it, but such is the high reputation of this and other establishments in the Bristol Channel for rapidity of despatch and consistently good workmanship that shipowners have continued to get their tonnage overhauls executed in this district. Amongst the work completed by the Mountstuart Company may be mentioned the heavy bottom damage to the steamers *Aldersgate* and *Bankfields*, bow and bottom damage to the *Solento*, bottom damage, including stern frame, to the *Knight of the Garter*, also general repairs to the *Cape Breton*, *Eastlands*, *Pontoporos*, *Dalecrest*, etc.

Channel Dry Docks and Pontoon Co., with its branch establishments at Cardiff, *viz.*, Bute Dry Dock Co. and Mercantile Pontoon Co., and its other branches at Barry, Newport and Sharpness, were, as usual, well engaged; but no sign of special activity was in evidence, most of the jobs executed being of the general repair order. The London steamer, *Ariadne Irene*, occupied their principal dry dock for a time during the execution of bottom damage repairs. Other work dealt with included general repairs to the *Arranmoor*, *Swazi*, *Trevider*, *Inverbervie*, *Haddon Hall*, *Headlands*, *Marsie*, *Ardgryle*, *Clan Buchanan*, *Belgien*, *Dora Horn*, *Ethiope*, *Caterino*, etc.; also heavy bottom damage on the *Southborough*.

Messrs. Elliot & Jeffery continued to secure sufficient work to keep their establishment well engaged, the class of work being survey and general repairs. Amongst the work dealt with may be mentioned the repair of bow damage on the *Auldgirth*, survey on the *Camlake*, and general repairs to the *Polmanter*, *Radley*, *Rossall*, *Taormina*, *Dauntless*, etc.

Junction Dry Dock Co. was engaged among other jobs on general repairs to the *Ethel Duncan*, *Southwaite*, *Olive*, *Arndale*, etc., as well as fitting a new propeller to the steamer *Kildonan*. The propeller for this steamer was cast and completed in the workshops of the Junction Company, and in all respects bore out the high reputation which this Company has gained for this particular class of work. The fact that the propeller was made here also bears out the statement that practically anything required for the purpose of ship repairing can be obtained in the Bristol Channel ports.

Messrs. Shearman & Hill's Dry Docks and Engineering Co. were consistently well engaged on general repairs to steamers afloat at Cardiff, and in addition the former company were also actively engaged at Barry and Avonmouth.

Penarth Pontoon and Slipway still continue to give rapid despatch and are consequently extensively patronized. Since the pontoon was acquired in 1910 total tonnage amounting to over one million has been docked, this constituting a splendid and enviable record. With the recent overhaul of the Slipway this Company is now giving even better despatch than formerly, as they are in a position to deal effectively with an increased amount of tonnage.

At Barry activity has been in evidence at the various establishments and they are enjoying a respite from the quiet condition of trade throughout the previous month.

The Barry Graving Dock Co. were excellently engaged on general repairs on the *Palestrina*, *Milwaukee*, *Asimina*, *Innesmoor*, *Onwen*, *Gorsefield*, *Photinia*, etc., and other minor work throughout the dock.

Messrs. C. H. Bailey were working to the top limit of their capacity and have executed, among other jobs, heavy repairs to the oil-tanker *Baku Standard*, damage repairs to the *Hemisphère*, survey work on the *Atlas*, *Waltham* and *Pruth*, and general repair work on the *Glenfruin*, *Buranda*, *Burbridge*, *Frederick Knight*, *Mar Baltico*, *Mar Cantabrico*, *Coreovado*, *Jumna*, *Maria de Larrinaga*, *Wearwood*, *Rosella*, *Ventura de Larrinaga*, *Devon City*, *Pagassari*, *Rose Lea*, etc., and at their Newport establishment completed repairs to the *Bramley*, *Alfalfa*, *Mar Negro*, *Wyandotte*, etc. The amount of work executed by this firm in the course of each year warrants it being placed in the front rank of the ship-repairing establishments in the Bristol Channel.

At Swansea and Port Talbot a fair amount of work has been executed, but nevertheless things did not emerge from their usual quiet state at these ports.

Loss of Cardiff Pilot Steamer. — A distressing accident occurred in the Bristol Channel during the month, resulting in the sinking of the Cardiff pilot steamer *W. W. Jones*, with the loss of the captain and four others. The pilot steamer was engaged on her station between Nash Point and Breaksea lightship, and was at the time of the accident manœuvring in readiness to take off the pilot from the outward-bound steamer *Star of New Zealand*, belonging to Messrs. J. P. Corry & Co., Belfast and London. Owing to some mischance at present unexplained, the *Star of New Zealand* struck the pilot steamer with such force that the smaller boat disappeared in about three minutes. Luckily the "Star" boat possesses anchors of the old-fashioned stock type, the cables of which pass from the hawse pipe to the anchor bed on the forecastle head, and it was due to the presence of these chains that the survivors were enabled to clamber on board the "Star" boat while the two boats were locked fast. It is probable that all might have been saved but for the fact that the mast and funnel of the foundering pilot steamer knocked some of the men off the chain as the boat disappeared. Usually in shipping circles the use of old-fashioned anchors is deprecated, but it must in this instance be admitted that they justified their existence, although perhaps not in the orthodox manner.

This is the second occasion on which the *W. W. Jones* has had the misfortune to be sunk in collision, the former occasion being in January through collision with the Cardiff steamer *Lavernock* in Penarth Roads. After being raised, repaired and renovated, she had only resumed her work a few days before her present misfortune. She was formerly the steam yacht *Ros Marine*, and at one period of her career had been engaged on a notable treasure-hunting expedition to the Cocos Islands in the Pacific.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

John Crown & Sons, Ltd., Sunderland.

SINSEN. Launch, May 11th. A steel screw steamer built to the order of Messrs. Fearnley & Eger, of Christiania. The vessel is constructed with clear holds for the stowage of heavy cargoes, and is designed to carry a deadweight of about 3,140 tons on a light draught of water. The propelling machinery and boilers will be supplied and fitted by Messrs. George Clark, Ltd., of Southwick Engine Works. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers and flat of bottom and their patent "Bitumastic" covering to the tank tops.

Sir James Laing & Sons, Ltd., Sunderland.

BELRIDGE. Launch, April 29th. Oil-carrying steamer, built to the order of Wilh. Wilhelmsen, Esq., of Tonsberg, Norway. The *Belridge* is intended for the Pacific oil trade and is the third vessel built by Messrs. Laing for this owner. The principal dimensions are :—Length between perpendiculars 425 ft. ; breadth 57 ft., and depth, moulded, 33 ft., the carrying capacity being over 10,000 tons. The vessel is constructed on the Isherwood longitudinal system and to the highest class at Lloyd's under special survey, and complies with the Suez Canal and Factory Act regulations, also the requirements of the Norwegian Board of Trade. The machinery is situated aft, and a long poop deck is arranged to cover machinery and bunker space, and the vessel has a bridge amidships, as well as a topgallant forecastle, all connected with fore and aft gangways. Oil in bulk will be carried in nine double tanks, which are separated from bunkers and cargo hold by oil-tight cofferdams. Provision is made for water ballast in the after peak, deep tank forward, and under the engines and boilers in double bottom. The bunker capacity is specially large and arranged for either coal or oil fuel. A complete installation of steam heating pipes will be fitted in all holds and bunkers to facilitate the discharge of heavy oils. The vessel will be lighted throughout by electricity, and a complete installation for wireless telegraphy will be fitted. The propelling machinery, which will be supplied by Messrs. G. Clark Ltd., consists of triple-expansion single condensing engines, having cylinders 27 in., 45 in., 74 in., with a 54-in. stroke, steam being supplied from four large multitubular boilers working under forced draught. The oil-burning apparatus will be by the Wallsend Slipway and Engineering Co., to their latest practice.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

ELFLAND. Trial Trip, May 2nd. This vessel, built to the order of Messrs. Fred. Drughorn, Ltd., to carry general cargo, was taken for trial at sea, when a mean speed of 11 knots was attained. The vessel and her machinery are to Lloyd's highest class under the single-deck rule and have been constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. For Launch, see April issue.

Palmer's Shipbuilding & Iron Co., Jarrow.

HERMES. Launch, April 25th, 1914. Motor vessel, built to the order of the Anglo-Saxon Petroleum Co., Ltd., of London, for carrying oil in bulk. The vessel is about 350 ft. long, having a deadweight carrying capacity of over 5,000 tons, and is built on the transverse system of framing to class 100 A1 Lloyd's under special survey, and designed to meet Suez Canal requirements. Seven pairs of oil tanks are arranged below the main deck, with expansion trunk running the whole length between main and upper decks and summer tanks at the sides of trunks. The deep tank below the cargo hold forward is constructed for the carriage of oil fuel, as is also the double bottom below the boilers. The machinery, which has been constructed by the Werkspoor Co., Amsterdam, consists of two Diesel reversible four-cycle six-cylinder engines, working on six cranks and coupled direct to the screw shafts. A donkey boiler, working with a steam pressure of 120 lb. per square in., for heating and other auxiliary purposes, has been supplied by Palmer's Co., and is arranged to burn oil.

Palmer's Shipbuilding & Iron Co., Ltd., Hebburn.

MARICOPA. Launch, April 27th. Oil tank steamer, built to the order of Mr. Wilh. Wilhelmsen, of Tonsberg, The vessel, which is 425 ft. long between perpendiculars, having a total deadweight carrying capacity of over 10,000 tons, is built on the Isherwood system of framing to class 100 A1 Lloyd's special survey, for the carriage of oil in bulk, and is in accordance with Suez Canal requirements. She has nine pairs of oil compartments, with an expansion trunk running the whole length between main and upper decks, with summer tanks arranged for coal or oil fuel at sides. A deep tank for water ballast or oil fuel is fitted under the forward cargo hold. The *Maricopa* is to be fitted with triple-expansion engines, steam being supplied by four large single-ended boilers arranged for burning coal or oil fuel and working under a pressure of 180 lb. per square in., the whole being supplied by the Palmer's Co. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the boiler-room tanks and their patent "Bitumastic" covering to the tank top.

Short Bros., Ltd., Sunderland.

BRITISH PRINCE. Launch, May 8th. Steamer, built to the order of The Prince Line, Ltd., of Newcastle-on-Tyne, of the following dimensions :—Length, 440 ft. ; beam, 56 ft. 4 in. ; depth moulded, 37 ft. 7½ in. She is fitted with two complete steel decks and a shelter deck, with promenade deck over the midship portion. Her deadweight will be about 9,300 tons on a moderate draught of water with fine model. Ample water ballast is provided in the double bottom, fore and after peaks, and deep tank, to enable the vessel to make light passages with safety and despatch. The double bottom is also arranged for the carriage of oil fuel. The holds are sub-divided by eight water-tight bulkheads, and are free from obstructions, the decks being supported by strong girders and wide spaced tubular pillars. Sixteen derricks are fitted on houses at masts with cross trees above, and four derricks worked from Samson posts at cross bunker and deep tank hatches, in addition to a strong derrick lifting 30 tons, which may be worked from either mast, all the derricks being of Mannesmann steel tube. Thirteen steam winches, steam windlass, steam-steering gear (Wilson-Pirrie type) are installed in deck house aft, and worked by telemotor from wheelhouse and flying bridge, and steam ash hoist with shoot are fitted, taking steam from a large multitubular donkey boiler fitted on main deck. A complete installation of electric light is provided. The propelling machinery will be supplied by Messrs. The North-Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, and consists of quadruple-expansion engines with cylinders 25¾ in., 36½ in., 52½ in. and 76 in. diameter, with a stroke of 54 in., driven from three large multitubular boilers of 220 lb. pressure. Howden's forced draught is fitted and the vessel is expected to maintain an economic sea speed of 11½ knots. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the open bottom under boilers, double bottom, boiler space, bunkers, etc.

MOORISH PRINCE. Trial Trip, May 15th. This vessel, lately launched for the Prince Line, Ltd., of Newcastle-on-Tyne, has left the Wear for her official trials, which were in every way a success, the engines running smoothly and steadily and a mean speed of 13¾ knots being easily maintained. While under construction the hull and machinery have been under the supervision of Mr. J. McGovern. For Launch, see April issue.

Smith's Dock Co., Ltd., North Shields.

ICE-BREAKER. Launch. Steel screw tug and ice-breaker, built to the order of Messrs. John Reid & Co., for the Quebec Harbour Commissioners. The vessel is 128 ft. long by 26 ft. beam by 14 ft. deep. The machinery, which is also being constructed by Messrs. Smith's Dock Co., Ltd., has cylinders 16 in., 26 in. and 43 in. by 30 in. stroke.

Sunderland Shipbuilding Co., Sunderland.

STEELTON. Launch, May 11th. A single-decked steamer, built to the order of Messrs. Mathews Steamship Co., Ltd., of Toronto, Canada, for the Canadian Lake service, to take the highest class at British Corporation for this trade. The dimensions are :—Length b.p., 250 ft. ; breadth, 42 ft. 6 in., and depth, 18 ft. 6 in. Deck houses are placed aft over machinery with sun deck above, and over the topgallant forecastle is fitted a Texas house. The vessel is fitted with clear holds for the carrying of grain in bulk, and is built with deep cantilever frames in order to dispense with pillars. A complete installation of electric light is fitted, and all living rooms are heated by steam. The deck machinery consists

of four steam winches, steam-steering gear and direct steam capstan windlass. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 17 in., 28 in. and 46 in. by 33 in. stroke, steam being supplied by two large boilers working at a pressure of 185 lb. per square in.

DYKLAND. Trial Trip, May 2nd. This vessel, built to the order of Messrs. Fred. Drughorn, Ltd., of London, was successfully tried at sea, when she attained a speed of 11½ knots on the measured mile. For Launch, see May issue.

Swan, Hunter & Wigham Richardson, Newcastle-on-Tyne.

ARUM. Trial Trip, May 7th. Cargo motor vessel, one of the first of large size constructed in this country, and built to the order of The Flower Motor Ship Co., managers Messrs. M. Samuel & Co. Successfully tried at sea on above date, when a mean speed of 10¾ knots was attained. For Launch, see February issue.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend.

RUFFORD HALL. Launch, May 12th. Screw steamship, built to the order of Sir John Ellerman, Bart., for the Hall Line. This is the sixteenth ship that the builders have constructed for the lines controlled by Sir John Ellerman. One of the characteristics of the *Rufford Hall* is that she has a cruiser stern instead of the more usual overhanging counter. The vessel is built in accordance with the rules of the British Corporation. Her leading dimensions are 420 ft. overall length, with a beam of 53 ft. and a moulded depth of 32½ ft. The engines, driving a single propeller, are of the inverted direct-acting triple-expansion type. The multitubular boilers are fitted with Howden's forced draught. Both the main propelling machinery and boilers are being built by the Wallsend Slipway and Engineering Co. The construction of both the hull and engines has been under the supervision of Mr. Alex. Dalrymple, the owner's superintendent engineer.

R. Thompson & Sons, Ltd., Sunderland.

KONGSFOS. Launch, April 23rd. Cargo steamer, built to the order of Thor Thoresen, jun., Esq., of Christiania, Norway. Principal dimensions :—Length overall, 350 ft. 6 in. ; breadth extreme, 48 ft. 6 in. ; and depth moulded, 24 ft. 4 in. She will take the highest class at Lloyd's and is built to fulfil the requirements of the Norwegian Board of Trade, her construction being on the single-deck principle with steel lower deck in the fore and after holds. The erections consist of poop 30 ft. long, bridge deck 210 ft. long (both available for cargo), and topgallant forecastle for the comfortable berthing of the petty officers and crew. Ample water ballast is provided in the cellular double bottom and after peak, the main and engine-room tanks being divided in centre for trimming purposes. There are five large cargo hatches and seven steel tube derricks fitted on tables with crosstrees at mastheads. Five of the derricks are arranged to lift 5 tons each, one 10 tons and a large steel derrick capable of lifting a weight of 30 tons. Double derrick posts and derricks are also fitted to poop and bridge hatches, the whole being arranged for the rapid loading and discharging of cargoes and worked by eight powerful steam winches, and a large multitubular donkey boiler of ample capacity to supply steam to deck machinery. The vessel is fitted with a complete installation of electric light, and the berths all fitted with steam heaters, the specification of the whole vessel being very full and completely up-to-date. The engines, of the triple-expansion type, are by Messrs. The North-Eastern Marine Engineering Co., Ltd., Sunderland, having cylinders 24 in., 39 in. and 65 in., with a stroke of 42 in., steam being supplied by large boilers working at a pressure of 180 lb. per square in., Schmidt's superheaters being fitted.

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Thornaby-on-Tees.

CORNELIS. Trial Trip, April 30th. This vessel, built to the order of A. C. Lensen, Esq., of Terneuzen, was taken to sea for her trial trip, which proved highly satisfactory. During the whole of the run everything worked with the greatest smoothness and a mean speed of close upon 11 knots was maintained. After the trial trip the vessel proceeded to Hull under command of Captain E. W. Jibben. For Launch, see April issue.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

TAMAHA. Launch, April 25th. Steel screw steamer constructed to the order of The Tank Storage & Carriage Co., Ltd., of London, to fulfil the owners' requirements for their extensive oil-carrying trade. The vessel is being built on the Isherwood longitudinal framing system to class 100 A1 at Lloyd's, and is of the two deck type with poop, bridge and forecastle. Her principal dimensions are 434 ft. by 54 ft. 6 in. by 32 ft. 8½ in. moulded, and she will have a carrying capacity of about 9,250 tons on a light draught of water. Ten holds are provided, divided by centre bulkhead making twenty tanks, for the carriage of oil in bulk, and cargo hold forward. She will also have ten summer tanks in the 'tween decks at each side for the carriage of light oil. Oil bunkers will be carried in a deep tank forward and in cross bunker, giving a total capacity for oil of about 3,000,000 gallons. Water ballast will be carried in cellular double bottom under engines and boilers and in fore and aft peaks.

Insulated chambers will be provided for the ship's provisions and the steamer will have a very complete installation of electric light, while in the pump-room amidships will be fitted a large pumping installation consisting of powerful duplex oil pumps, each capable of dealing with 300 tons per hour. For the purpose of communication, a wireless installation on the Telefunken principle will be fitted, and also the Willett-Bruce system of electric whistle control. Quadruple-expansion engines, placed aft, having cylinders 24 in., 35 in., 50½ in. and 73 in. by 51 in. stroke, supplied with steam by three large single-ended boilers, working at 220 lbs. pressure under Howden's system of forced draught, will be fitted by the North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne. Oil fuel burning apparatus, by the Wallsend Slipway & Engineering Co , Ltd., is fitted to the boilers.

Wm. Gray & Co., Ltd., West Hartlepool.

DRUJBA. Launch, April 25th. Steel screw steamer, built for Messrs. F. C. Svorono & E. di Pollone, of Mariupol. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz* :—Length overall, 383 ft. ; breadth, 51 ft., and depth, 25 ft. 1½ in., with extra long bridge, poop and topgallant forecastle. The hull is built with deep frames, cellular double bottom and large aft and fore-peak ballast tanks, eight steam winches, twelve derricks, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 25 in., 41 in. and 68 in. diameter, with a piston stroke of 48 in., and three large steel boilers for a working pressure of 180 lbs. per square inch. The engine-room auxiliaries include a feed water heater with automatic air discharger, coupled to a filter, also a winch condenser, evaporator, feed and ballast pumps, all of the "Cmew" type.

ORMARA. Launch, May 11th. Steel screw steamer, built for The British India Steam Navigation Company, Ltd., London, to take the highest class in Lloyd's Register, and of the following dimensions :—Length overall, 392 ft. ; breadth, 51 ft. 6 in., and depth, 30 ft. She is a handsomely-modelled vessel, having two decks laid, with poop, long bridge and forecastle, and very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and the crew's berths in the forecastle. She is fitted with wireless telegraphy and has an electric light installation throughout. The hull is built with deep frames, cellular double bottom and after-peak ballast tank. The whole of the outfit, including sanitary tanks, fresh water distiller, steam windlass, steam-steering gear, twelve derricks, thirteen steam winches with return exhaust to winch condenser of the "Cmew" type, are of the most approved description. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 inches, and three large steel boilers adapted for 180 lbs. working pressure per square inch, and fitted with Howden's system of forced draught. The engine-room auxiliaries are very complete and include evaporator, feed and ballast pumps, independent feed pumps combined with a gravitation filter,

feed-water purifier, direct-contact heater and oil separator, all of the "Cmew" type.

ROSENBORG. Launch, May 12th. Steel screw steamer, built to the order of C. K. Hansen, Esq., Copenhagen. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.* :—Length overall, 290 ft. 6 in. ; breadth, 40 ft. ; depth, 21 ft. 4 in., with long bridge, poop and forecastle. The hull is built with deep frames, cellular double bottom and large after-peak ballast tank, five steam winches, steam-steering gear, hand screw gear aft, patent direct steam windlass, vertical multitubular donkey boiler, steel shifting boards, stockless anchors, telescopic masts with fore and aft rig, cargo gaffs, and derricks, boats on deck overhead, and all requirements for a steamer specially equipped for the Baltic and home trades. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 20 in., 31½ in. and 53 in. diameter, with a piston stroke of 36 in., and two large steel boilers with a working pressure of 180 lbs. per square inch. The engine-room auxiliaries include an evaporator, feed and ballast pumps of the "Cmew" type.

BOEROE. Trial Trip, April 25th. A very satisfactory trial took place of this steel screw steamer, built for The Netherland Steamship Co., of Amsterdam. The vessel has been built to the highest class in Lloyd's Register, and also conforms to the requirements of Dutch Law. Her principal dimensions are :—Length overall, 433 ft. 6 in. ; breadth, 54 ft. 6 in., and depth, 36 ft. For Launch, see April issue.

UBIER. Trial Trip, May 12th. Steel screw steamer, built for The Mercantile & Shipping Co., Ltd., Antwerp. The vessel has been built to the highest class in Lloyd's Register, and her principal dimensions are :— Length overall, 331 ft. 6 in. ; breadth, 46 ft. ; and depth, 23 ft. 5½ in., with long bridge, poop, and topgallant forecastle. The saloon, state-room, captain's, officers' and engineers' rooms, etc., are fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom, and large after-peak ballast tank, six steam winches, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, shifting boards throughout, and telescopic masts with fore and aft rig. Triple-expansion engines have been supplied by the Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in. and 62 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The engine-room auxiliaries include an evaporator, feed and ballast pumps, of the "Cmew" type. The performance of the ship and machinery was entirely satisfactory.

W. Harkess & Son, Ltd., Middlesbrough.

PATROL. Launch, May 9th. Screw steamer, built to the order of the Hon. Corporation of Trinity House for their service between Dover and the Humber. Dimensions 135 ft. by 23 ft. by 12 ft. 6 in. moulded. She is built to a full specification and to Lloyd's 100 A1 class. Fitted with electric light, Hastie's steam steering gear, Harfield windlass. Engines are by Messrs. MacColl & Pollock, Ltd., Sunderland, and will drive the vessel a speed of 11 knots on service.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

CORINTHIC. Launch, May 11th. Steel screw steamer, built to the order of Messrs. W. H. Cockerline & Co., Hull. The principal dimensions are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to Lloyd's highest class, having a single deck of steel with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations ; four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches and ten derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand screw gear aft. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons" standard triple-expansion engines, having cylinders 25½ in., 42 in. and 70 in. by 48 in. stroke, with three large boilers working at a pressure of 180 lbs. per square inch. The condenser is of the "Contraflo" type, with air pump temperature regulator, and the engine-room auxiliaries include "Contraflo" winch condenser, cascade feed water filter and heater, a Morison's evaporator, large ballast donkey and harbour feed pump, etc. The hull and machinery have been constructed under the supervision of Mr. G. H. Strong, the owners' superintendent.

PANAMA TRANSPORT. Launch, April 24th. Built to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., managers), London. The dimensions of the vessel are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draught. She is built to British Corporation classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed on the deep frame principle, giving exceptionally clear holds for the stowage of bulky cargoes, and is divided into seven watertight compartments by six transverse bulkheads. Wood grain divisions are fitted throughout the holds, according to the latest Board of Trade regulations. Four large hatches are provided and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including ten steam winches exhausting into a "Contraflo" winch condenser and ten derricks. A powerful quick-warping steam windlass is fitted forward, and combined steam and hand-steering gear on the Wilson & Pirrie principle is fitted in a house aft, with telemotor attachment to the bridge. A large ice-house is also fitted for the crew's provisions, etc. Triple-expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25 in., 40 in. and 68 in. by 48 in., with three large boilers working at a pressure of 180 lbs. per square inch.

Irvine's Shipbuilding and Engineering Co., West Hartlepool.

PENGREEP. Trial Trip, May 19th. This steamer has run her official trial trip in Hartlepool Bay. The vessel has been built for R. B. Chellow, Esq., Truro. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12½ knots being attained, and the vessel afterwards proceeded on her voyage. For Launch, see May issue.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

PONTWEN. Launch, April 28th. Steel screw steamer of the following dimensions :—Length overall, 394 ft. ; breadth extreme, 51 ft. ; depth moulded, 30 ft. 4 in. ; gross tonnage about 4,800 tons. This vessel, which has been built to the order of The W. & C. T. Jones Steamship Company, Ltd., of Cardiff, will class 100 A1 in Lloyd's Register, and has been built under Special Survey. She is of the single-deck type, and has cargo poop, bridge amidships and topgallant forecastle for crew, accommodation for captain, officers and engineers being fitted up in steel houses on bridge deck. A cellular double bottom throughout and peak tanks are fitted for water ballast, and equipment includes seven steam winches, winch condenser for dealing with exhaust steam with separate circulating donkey, horizontal multitubular donkey boiler, steam windlass with quick-warping ends, fourteen derricks, stockless anchors, steam-steering gear, etc., etc. The engines, by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in. and 70 in., with a stroke of 48 in., steam being supplied by three single-ended boilers having a working pressure of 180 lbs. The hull and machinery have been constructed under the supervision of Mr. Geo. W. Wilson, owners' superintendent engineer.

Ropner & Sons, Ltd., Stockton-on-Tees.

LEVNET. Launch, May 11th. Steel screw single-deck steamer, of the following dimensions :—Length, 351 ft. 6 in. ; breadth, 48 ft. 6 in. ; depth, 24 ft. 4 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, bridge and topgallant forecastle, accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle, and has been built to the order of The Gordon Steam Shipping Co., Ltd., London. She has double bottom for water ballast on the cellular principle, and in after peak, and will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam-steering

gear amidships, and powerful hand screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include eight steam winches, steam being supplied by a large donkey boiler, working at 100 lbs. pressure of steam. The engines will be of the triple-expansion type, by Messrs. Blair & Co., Ltd., Stockton-on-Tees, having two steel boilers 16 ft. by 10 ft. 6 in., 180 lbs. pressure of steam.

THE HUMBER.

Goole Shipbuilding & Repairing Co., Ltd., Goole.

BARGE. Launch. Twin-screw crane barge, capable of lifting 60 tons. The vessel is 160 ft. between perpendiculars, 50 ft. in beam, and 14 ft. in depth (moulded). The deck equipment of the vessel is almost identical with that of a modern steamer. Twin-screw engines of fair power will be supplied by Tees engineers. The vessel has been built to the order of Messrs. Sir W. G. Armstrong, Whitworth & Co., Elswick Works, Newcastle-on-Tyne, for Messrs. Sir John Wolfe Barry, A. J. Barry, Sir Walter Hughes, and K. A. Wolfe Barry, acting on behalf of the Bombay Port Trust. She is intended for dock work in Bombay Harbour, and on completion will leave for Bombay under her own steam.

Cochrane & Sons, Selby.

THOMAS STRATTEN. Launch, April 11th. Steel screw trawler, the principal dimensions being 136 ft. 8 in. by 23 ft. 9 in. by 13 ft. moulded. The vessel has been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., Hull.

ITONIAN and GANTON. Launches, April 9th. Steel screw trawler, *Itonian*, the principal dimensions being 136 ft. 8 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. The Great Central Co-operative Engineering and Ship Repairing Co., Ltd., Grimsby, and will be fitted with powerful quadruple-expansion engines by themselves. Trawler *Ganton*, principal dimensions 140 ft. by 23 ft. 9 in. by 13 ft. 3 in. moulded. The vessel has been built to the order of Mr. J. H. Collinson, of Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

NORTH-WEST OF ENGLAND.

Cammell, Laird & Co., Ltd., Birkenhead.

CUIDAD DE BUENOS AIRES. Launch, May 12th. Twin-screw steamer, the first of two vessels for the Argentine Navigation Co. The vessel is intended for cross-Channel night service between Buenos Aires and Monte Video, and is sumptuously fitted. The length overall is 364 ft., and the speed will be 18 knots. The machinery consists of two sets of Parsons geared turbines. Accommodation will be provided for 500 first-class and 275 second-class passengers. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the holds, engine and boiler spaces, water ballast tanks, etc.

H. & C. Grayson, Ltd., Garston.

No. 80 (LIGHT VESSEL). Launch, May 9th. Iron light ship for the Trinity House authorities of the following dimensions:—104 ft. long on the water line, with a beam of 26 ft. and a moulded depth of 15 ft., gross tonnage 300. The ship has a fixed mast containing a ladder leading to the lantern. She will be fitted with a powerful illuminant and fog signal, and has sufficient water-tight compartments to keep her afloat even if any two were pierced by collision. Wireless telegraphy will be installed on the vessel prior to being placed on her station, and she is expected for delivery in London about July.

SOUTH OF ENGLAND.

Phillip & Sons, Ltd., Dartmouth.

ARAWANA. Launch, May 9th. Twin-screw passenger steamer, building to the order of the Crown Agents for the Colonies. The principal dimensions are:—Length b.p., 100 ft.; beam moulded, 23 ft.; depth moulded, 9 ft. The hull of the vessel is sub-divided by four steel water-tight bulkheads, the compartments consisting of fore and aft peak tanks, fore and main holds and engine and boiler spaces. The whole of the accommodation for passengers, officers and crew is arranged above the main deck so as to admit of good ventilation for the tropical climate in which the vessel is to work. A steel mast is fitted forward for carrying a derrick to work the fore cargo hold. A steam winch is also fitted for quick handling of cargo and baggage. A large space is specially provided on the fore part of main deck for the carriage of motor cars, waggons and cattle, specially large doors being provided in the bulwarks for easy embarking and disembarking. The aft part of main deck is specially arranged with seating accommodation for third-class passengers. Two sets of compound surface-condensing engines are arranged in a roomy engine-room amidships, being supplied with steam at 140 lbs. pressure by a large single-ended horizontal return tube marine type boiler. Especially large independent air and circulating pumps are provided, also independent feed and general service donkey pumps. Steam windlass is to be fitted in topgallant forecastle; steam-steering gear is also to be fitted, and the vessel is to be lighted throughout with electricity.

BAIARA. Trial Trip, May 6th. This twin-screw passenger steamer, built to the order of the Crown Agents for the Colonies, has been successfully tried at sea. The vessel is the second of the six similar vessels which Messrs. Phillip and Son are building for passenger ferry service in British Guiana. For Launch, see April issue.

ARAPAIMA. Trial Trip, April 21st. Twin-screw passenger steamer, built to the order of the Crown Agents for the Colonies, was successfully tried at sea, when a speed of 10·4 was obtained. For Launch, see March issue.

John I. Thornycroft & Co., Ltd., Southampton.

H.M.S. LOOKOUT. Launch, May 4th. Torpedo-boat destroyer, a sister to the *Lance*, launched from the same yard a few weeks ago. Dimensions about 270 ft. in length and 27 ft. 6 in. beam, and is fitted with Parsons turbines and water-tube boilers, burning oil fuel. The hull, propelling machinery, and boilers are being built complete in Messrs. Thornycroft's yard and works.

SCOTLAND.

Ardrossan Shipbuilding Co., Ardrossan.

ROBINA. Launch, April 28th. Twin-screw passenger steamer, built to the order of the New Central Morecambe Pier Co. for passenger traffic between Morecambe, Blackpool and the Isle of Man. The vessel is 160 ft. in length, 26 ft. in beam, and 9 ft. 6 in. in depth (moulded). It is fitted with triple-expansion engines. The engines have been supplied by Messrs. Mackie & Baxter, Glasgow, and are designed to give the vessel a speed of 14 knots. It is handsomely fitted and appointed throughout, having a first-class lounge forward panelled in oak and aft saloon panelled in oak. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, also to the flat of bottom, etc. Accommodation is provided for 650 passengers. The vessel has been built under the survey of Lloyd's and the Board of Trade. This is the first vessel of the type which has been built at Ardrossan.

Bow, McLachlan & Co., Ltd., Paisley.

SABLE I. Launch, May 2nd. Vessel to be used in the sealing trade and launched for Captain Farquhar, of Halifax. She is specially designed for her trade, the scantlings being exceptionally strong to withstand and break up the ice. Electric light is fitted to the vessel, and there is a complete installation of steam heating.

Campbeltown Shipbuilding Co., Campbeltown.

GIACOMA FELTRINELLI. Trial Trip, April 23rd. Built to the order of Messrs. Fratelli Feltrinelli, Milan, this vessel completed very satisfactory speed and consumption trials on the Clyde. The vessel has been built to Lloyd's highest classification, and is also being classed in the Registro Nazionale Italiano. She is of the well-decked type with raised quarter deck, bridge and topgallant forecastle, and about 1,300 tons gross measurement and 2,300 tons dead weight on a small draught. The machinery has been supplied by Messrs. J. G. Kincaid & Co., Greenock, and consists of triple-expansion engines supplied with steam from two large cylindrical boilers working at a pressure of 180 lbs. A very full specification and deck and engine-room auxiliary

machinery for the owners' special requirements have been supplied.

Wm. Chalmers & Co., Ruthergien.

INNISULVA. Launch, April 16th. Single-screw motor coaster for the Coasting Motor Shipping Co., of Glasgow. 115 ft. in length, 21 ft. 6 in. in breadth, 11 ft. in depth moulded and designed to carry 400 tons deadweight on a draught of 10 ft. The engines are by Messrs. William Beardmore and Co., and are of their hot-bulb type, reversing by compressed air, with an auxiliary engine driving an air compressor for starting. The hull and machinery are to the survey of the British Corporation.

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

FERENCZ FERDINAND. Trial Trip, May 2nd. This vessel, built for the Royal Hungarian Sea Navigation Co., "Adria," ran successful trials. She is equipped with eight lifeboats, including one with a motor of 21 h.p., and she will run between Trieste, North African ports, the Atlantic Coast of Morocco and the Canary Islands. For Launch, see February issue.

C. Connell & Co., Ltd., Scotstoun.

SPECTATOR. Launch, April 30th. Steamer, of about 3,800 tons gross, built to the order of Messrs. T. & J. Harrison, Liverpool. This vessel has been built to Lloyd's highest class, and fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines with all the latest improvements are being supplied by Messrs. Dunsmuir & Jackson, Govan. Messrs. Matthew Keenan and Co., Ltd., have the contract to cover the boilers and steam pipes with their patent non-conducting composition.

Fleming & Ferguson, Ltd., Paisley.

MATTHEW FLINDERS. Launch, April 23rd. Steel screw steamer built to the order of the Government of Queensland. The vessel has been specially designed for pilot service, and will be employed in this work at the port of Brisbane. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" cement has been applied to the flat of bottom and frame riveting. The vessel has been constructed under the superintendence of Mr. James Tearoe, C.E., executive engineer to the Queensland Government, and of Mr. William Scopes, local inspector.

Ferguson Bros., Ltd., Port Glasgow.

PONRABBEL. Launch, May 11th. Twin-screw bucket ladder dredger, for the Marine Board of Launceston, Tasmania. She is of the bow well centre ladder type, built to Lloyd's highest class. The vessel is constructed substantially throughout for dredging hard material, and is fitted with two sets of buckets, one set of 23 cubic ft. capacity and one of 13 cubic ft. capacity. Steam is supplied from two cylindrical return multitubular boilers. The machinery consists of compound surface-condensing engines arranged so that one or both can work the dredging machinery. The whole of the gear, tumblers and bucket backs are of cast steel, the hoisting gear for bucket ladder is on the double brake system, driven by powerful steam engine on the builders' improved system. Powerful steam winches are fitted at bow and stern for manipulating mooring chains and holding the dredger up to its work.

John Fullerton & Co., Ltd., Paisley.

ABERDALE. Launch. A steel-screw steamer, 830 tons deadweight capacity, built to the order of Messrs. Wm. Postlethwaite & Son, Liverpool, for general coasting and Continental trade. Triple-expansion engines of 700 h.p. are being supplied by Messrs. Fishers, Ltd., Paisley.

Greenock & Grangemouth Dockyard Co., Greenock.

SAXONIAN. Launch, May 14th. This vessel is being built to the order of the Petroleum Steamship Co., Ltd. (Messrs. Lane & Macandrew, managers), for the carriage of oil in bulk. Her dimensions are:—Length between perpendiculars, 374 ft.; breadth moulded, 51 ft. 3 in.; depth moulded, 29 ft. 4 in. The vessel will carry about 6,700 tons deadweight and is to conform to the Suez Canal regulations in all respects. The engines, which are of the triple-expansion type, are being constructed by Messrs. Dunsmuir & Jackson, Ltd., of Glasgow, and have cylinders 27 in., 44 in. and 73 in. with a stroke of 48 in., supplied with steam from three large single-ended boilers working at a pressure of 180 lbs. The pumping arrangements are of the latest description, the vessel being fitted with three large pumps of the duplex type, capable of discharging 200 tons per hour each. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the engine and boiler-room tanks, bunkers, etc., and their patent "Bitumastic" covering to the tank tops. The bunkers are constructed to carry both coal and oil fuel. The donkey boiler will be fitted with the necessary mountings to conform to the Hamburg Police Regulations. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and steam pipes with their patent non-conducting composition. Winches and capstan of ample power are fitted to manœuvre the vessel. Electric light installation is fitted throughout.

Hall, Russell & Co., Ltd., Aberdeen.

CARGO STEAMER. Launch. Steel screw cargo steamer for Messrs. C. R. Davidson & Co., Aberdeen. The vessel, which will take the highest class with Lloyd's Register, is of the following dimensions:—Length, 173 ft.; breadth, 25 ft.; and depth, 15 ft. 6 in. Steel boilers and triple-expansion engines will be fitted by the builders.

Wm. Hamilton & Co., Ltd., Port Glasgow.

STEAMER. Launch. Screw steamer for the Lancashire Shipping Co., Liverpool (James Chambers & Co., managers). The principal dimensions are:—Length, 440 ft.; breadth, 53 ft.; depth, 32 ft. 6 in. to upper deck; and deadweight, 9,200 tons. The vessel is classed with Lloyd's Register for their highest class longitudinal framing. Triple-expansion engines are being supplied by Messrs. D. Rowan & Co., Glasgow.

Harland & Wolff, Ltd., Glasgow.

EGORI. Launch, April 22nd. Steel screw steamer, built to the order of Messrs. Elder, Dempster & Co., Ltd. The *Egori* is 419 ft. 6 in. in length overall and 54 ft. extreme beam, with a gross tonnage of about 5,000. The new vessel, which has been constructed under Lloyd's survey for the 100 A1 class, and in compliance with the Board of Trade requirements for passenger certificate, has a double bottom constructed on the cellular principle, and steel decks with seven water-tight bulkheads dividing the vessel into eight water-tight compartments. The *Egori* has been specially designed for trading, in the Company's service, to the West Coast of Africa and has every facility for the rapid loading and discharge of cargo; also comfortable accommodation for a number of first and second-class passengers. The steering gear is of Messrs. Harland & Wolff's well-known type, and the vessel has a complete installation of electric light. The whole of the passenger and crew accommodation is efficiently ventilated by natural means. The vessel will be fitted with triple-expansion engines constructed by the builders.

D. & W. Henderson & Co., Ltd., Glasgow.

HERSCHEL. Launch, April 23rd. Steel screw steamer of about 6,200 tons gross, built to the order of Messrs. Lamport & Holt, Ltd., Liverpool. This addition to the Lamport and Holt fleet is 450 ft. long overall by 55 ft. broad by 30 ft. depth moulded, is classed in Lloyd's 100 A1, and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner, and has an exceptionally large number of powerful derricks and steam winches, which provide ample means for the rapid handling of large cargoes. Commodious accommodation is provided under the bridge deck for about 200 third-class passengers. The vessel is replete with everything that can add to the safety of the vessel and the comfort of those on board, including electric light installation, extensive refrigerating plant, powerful combined steering gear with telemotor control and steam heating throughout all accommodation. The machinery, which has been constructed by the builders, consists of quadruple-expansion engines, balanced on the Yarrow, Schlick & Tweedy system, having cylinders 25¾ in., 36 in., 51 in. and 73½ in. diameter by 54 in. stroke, with steam from three double-ended boilers at 215 lbs. pressure. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bilges, tanks, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

A. McMillan & Son, Ltd., Dumbarton.

HOLSATIA. Trial Trip, May 19th. This new steamer, built for the Hamburg-Amerika Line, of Hamburg, has run successful trials on the Firth of Clyde. For Launch, see May issue.

Murdoch & Murray, Port Glasgow.

CACHOEIRA. Launch, April 27th. Steel twin-screw steamer, the first of two duplicate vessels building to the order of Messrs. J. G. Kincaid & Co., Ltd., Greenock, for service in Bahia. The principal dimensions are :—Length, 135 ft. ; breadth, 25 ft. ; depth moulded, 10 ft.

Russell & Co., Port Glasgow.

SIKH. Launch, May 7th. Steamer, of 5,000 tons gross, built for the Asiatic Steam Navigation Co., Liverpool. The vessel, which has been built to the highest class at Lloyd's for her owners' Eastern trade, is 405 ft. in length, 52 ft. 3 in. in breadth, and 30 ft. in depth, moulded. Messrs. Rankin and Blackmore, Greenock, will supply the engines. The steamer will complete her fitting out in Messrs. Russell's Kingston basin.

PRINCIPE DE ASTURIAS. Launch, April 30th. Twin-screw shelter deck steamer of 8,200 tons gross, for Messrs. Pinillos, Izquierdo & Co., Cadiz. The vessel, which is 460 ft. in length, 58 ft. 3 in. in breadth, and 39 ft. 6 in. in depth moulded to shelter deck, has been constructed to the highest class at Lloyd's. She is specially intended for her owners' passenger and emigrant trade between Spanish ports and America. Accommodation is provided for 1,500 emigrants between decks, and also for 108 third-class, 120 second-class, and 114 first-class passengers. Messrs. David Rowan and Co., Glasgow, will supply quadruple-expansion engines. The steamer is a sister ship to the *Infante Isabel*, launched two years ago by Messrs. Russell & Co. for the same owners.

Scott's Shipbuilding & Engineering Co., Ltd., Greenock.

MUNWOOD. Launch, May 7th. A vessel of 3,500 tons gross, built for Messrs. Clark & Service, Glasgow, for their trade between New York and Cuba. The principal dimensions of the vessel are :—Length, 340 ft. ; breadth, 48 ft. ; depth, 26 ft. 6 in. Special facilities have been provided for the rapid handling of cargo. The builders will supply triple-expansion engines.

IRELAND.

Workman, Clark & Co., Ltd., Belfast.

CITY OF VIENNA. Trial Trip, May 2nd. This new steamer, built for the Hall Line Branch of the Ellerman Lines, Ltd., left Belfast Harbour and proceeded to Carrick Roads for adjustment of compasses, machinery tests and speed trials. The results attained were highly satisfactory, and the vessel afterwards left for Glasgow to take in coal and load cargo for the initial voyage to Calcutta. For Launch, see May issue.

BOARD OF TRADE EXAMINATIONS.

FEBRUARY 19th, 1914.—LONDON.—*1st Class :* H. Bronsdon, C. Millar, E. Waters. *2nd Class :* W. Harman, J. Savage.

SOUTHAMPTON.—*1st Class :* L. Copp, W. Rowe. *2nd Class :* J. Whidborne.

GLASGOW.—*1st Class :* W. McPherson. 2nd *Class :* A. Beveridge, J. Brown, R. Chapman, J. Diamond, A. Fisher, W. Hall, E. Keess, T. Lawson, J. Paterson.

LEITH.—*1st Class :* W. McIntosh, C. Peace, W. Saunders, J. Thomson. *2nd Class :* T. Dingwall, W. Dodds, J. Dryden,

LIVERPOOL.—*1st Class :* A. Hill. *2nd Class :* E. Davenport, T. Guest, A. Hill.

CARDIFF.—*1st Class :* A. Evans, J. Langdon, L. Wright. *2nd Class :* H. Davies, E. Edwards, J. James, C. Rossiter.

WEST HARTLEPOOL.—*1st Class :* C. Fenton. *2nd Class :* J. Addie, F. Daughtry, W. Humes, W. Purvis.

NORTH SHIELDS.—*1st Class :* A. Dotchin, R. Jobling. *2nd Class :* N. Brown, S. Dawson, W. Isbister, A. Johnson, G. Peacock, J. Stephenson, J. Turner, T. Watt.

FEBRUARY 26th, 1914.—LONDON.—*1st Class :* H. Gascoyne, M. Ninnes, L. Sorge. *2nd Class :* H. Jarvis, W. McCredie, C. Thompson, P. Thurlow, R. Shearman.

GREENOCK.—*1st Class :* P. Holden, J. Smithe, A. Walker. *2nd Class :* W. McCowan, J. Mackay, W. Shaw, D. Steinke, D. Sweeney.

SUNDERLAND.—*1st Class :* A. Peddie. *2nd Class :* P. Barlow, W. Graham.

HULL.—*2nd Class :* J. Copeland.

LIVERPOOL.—*1st Class :* S. Cowley, H. Haworth, J. Thomson. *2nd Class :* H. Barnes, H. Brookes, T. Cartwright, V. Cooper, C. Hollman, G. Michael, S. Phipps, C. Todd, J. Wood.

BRISTOL.—*1st Class :* W. Webb. *2nd Class :* E. Blight.

NORTH SHIELDS.—*1st Class :* W. Mowat, W. Thompson, *2nd Class :* B. Mapplebeck, W. Navin.

ABERDEEN.—*2nd Class :* G. Grant, J. Spittal.

MARCH 5th, 1914.—LONDON.—*1st Class :* W. Best, T. Lloyd, H. Rawlings, E. Robinson. *2nd Class :* J. MacDonald, J. MacFarlane, H. Rutter, F. Tod.

BELFAST.—*1st Class :* J. Murphy, M. Smiles. *2nd Class :* J. Conroy, F. Drean, R. Milliken, J. Purdy.

GLASGOW.—*1st Class :* W. Davidson, J. MacLeod, W. Smith. *2nd Class :* D. Macdonald, J. Mawdsley, J. Murdock.

CARDIFF.—*1st Class :* W. Barker, W. Bryant, A. Miles. *2nd Class :* I. Evans, E. Hopkins, J. Polyblank, E. Richards.

LIVERPOOL.—*1st Class :* W. Dunsmore, J. Hall, H. Morris, J. Roberts, F. Shaw. *2nd Class :* G. Baxter, H. Bindon, C. Taylor.

SOUTHAMPTON.—*1st Class :* G. Manning. *2nd Class :* R. Philp, W. Sleep, R. R. Thackara.

LEITH.—*1st Class :* W. Millar. *2nd Class :* J. Duncan, J. Young.

NORTH SHIELDS.—*1st Class :* C. Brown, D. Evans, R. Williams. *2nd Class :* W. Dawson, A. Hollings, H. Layton, S. Overton, B. Robson, F. Standard, A. Temple, J. Wray.

MARCH 12th, 1914.—LONDON.—*1st Class :* S. Halls, A. Taylor. *2nd Class :* W. Bloomfield, G. Bussnel, D. Geddes, W. McNab, T. Potts, G. Skinner.

NORTH SHIELDS.—*1st Class :* A. Cumming, J. Johnston, J. Keeheer, N. Lawrie, W. McGhie, R. Moffitt, E. Richardson, R. Smith. *2nd Class :* J. Cartledge, A. Dumont.

GREENOCK.—*1st Class :* R. Allan, J. Archibald, J. Park, J. Thomson. *2nd Class :* A. Ritchie, A. Watson.

LIVERPOOL.—*1st Class :* H. Cannon, J. Grant, J. Hill, F. Kingdom, J. Robinson, W. Sutcliffe. *2nd Class :* E. Etches, J. Evans, H. Jones, W. Macaulay, C. McPherson, C. Tudor, R. Wilkinson.

DUBLIN.—*2nd Class :* F. Magee.

HULL.—*1st Class :* G. Gebler, F. Holmes, E. Jewsbury. *2nd Class :* G. Freeman.

DUNDEE.—*1st Class :* D. Archer. *2nd Class :* A. Balfour, A. Black, J. Donaldson, T. Donaldson.

MARCH 19th, 1914.—LONDON.—*1st Class :* M. Henderson, T. Smith.

GLASGOW.—*1st Class :* W. Herbert, G. Redpath, G. Watson, J. Wilson. *2nd Class :* W. Crichton, D. Fisher, S. Grassick, J. McCrone, H. O'Neill, E. Tyson, W. Tolmie.

WEST HARTLEPOOL.—*1st Class :* G. Jackson, C. Naisbitt. *2nd Class :* A. Hancock, R. Jefferson, A Metcalf, E. Moorsom, C. Pettit, G. Walton.

NORTH SHIELDS.—*1st Class :* J. Carnegie, J. Crammond, W. Hedley, W. Thompson. *2nd Class :* H. Atkinson, E. Cowey, C. Richter.

LIVERPOOL.—*1st Class :* J. Campbell, J. Helton, J. Phillips, A. Reece, C. Shore. *2nd Class :* R. Bryden, H. Hughes, G. Newton, R. Peattie, C. Quayle, A. Shirley.

CARDIFF.—*1st Class :* T. Burnett, A. Howson. *2nd Class :* J. Davis, R. Dent, S. Haywood, J. Wilson.

SOUTHAMPTON.—*1st Class :* W. Cordiner, H. Raneson, W. Tidman, C. Williams. *2nd Class :* W. Fraser, F. Leggett, S. Shorto, H. Thwaites, J. Veal.

LEITH.—*1st Class :* J. Spark. *2nd Class :* D. Anderson, D. Waddell.

MARCH 26th, 1914.—LONDON.—*1st Class :* B. Gregg, G. Rutledge, C. Shekyls. *2nd Class :* E. Fuche, W. Kean, W. Kennedy, J. Miller, A. Rankine, E. Wood.

ABERDEEN.—*2nd Class :* A. Chalmers, J. Mearns, J. Robertson.

BRISTOL.—*1st Class :* A. Brace.

LONDONDERRY.—*1st Class :* D. Scott.

SUNDERLAND.—*1st Class :* H. Glass, W. Robson, H. Scott, T. Scott. *2nd Class :* A. Dunn, W. Tate.

LIVERPOOL.—*1st Class :* F. Hooton, J. Jones, W. McKie, H. Wright. *2nd Class :* W. Austin, W. Barker, F. Booth, T. Gregory, J. Williams.

NORTH SHIELDS.—*1st Class :* W. Bowles. *2nd Class :* S. Davison, W. Fawcett, W. Peel.

GREENOCK.—*1st Class :* P. Buchanan, W. Crorie, W. McEwen, W. Mackersie, W. Nimmo, R. Rodger. *2nd Class :* J. Dempster, A. Gray, D. Geddes.

WE regret to have to report the death of Mr. Francis J. Trewent, the well-known naval architect and head of the firm of Messrs. F. J. Trewent & Proctor, Ltd., of Billiter Buildings, London, E.C. The deceased, who was sixty-three years of age, started in business in London in 1891. Prior to that he had served in the yards of Messrs. R. Napier & Sons, Messrs. Wigham Richardson & Co., Messrs. Earle's Shipbuilding & Engineering Co., Ltd., Hull, where he rose to be assistant yard manager. He had also been manager for Messrs. C. S. Swan & Hunter and Messrs. R. & W. Hawthorn, Leslie & Co.

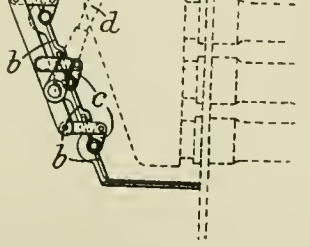
THE Merchant Shipping Advisory Committee, whose term of office is about to expire, have submitted a report to the President of the Board of Trade, placing before him a summary of the subjects considered by them between November, 1911, and March, 1914. The subjects include life-saving appliances rules, fire alarm and extinguishing apparatus for passenger and cargo vessels, wireless telegraphy, ice observation, steamship routes, steamship speeds, searchlights, access to bulkheads, Board of Trade survey staff, etc. Fifteen meetings of the Committee and fifty-three meetings of the Sub-committee were held. Some of the recommendations made by the Committee have been embodied in the International Convention on Safety of Life at Sea.

THE FAIRFIELD SHIPBUILDING & ENGINEERING CO., LTD., GOVAN, have secured an order for a battleship for the British Navy. The new vessel is one of the four battleships of the 1914-15 programme, two of which have been given out to contract, while the other two will be built in Royal dockyards. The vessels are to be built from the designs of Mr. E. H. Tennyson D'Eyncourt, the Director of Naval Construction, who designed the *Royal Sovereign* and her four sister ships. The new battleships are each to have a displacement of 25,500 tons and a speed of 22½ knots. Their armament will consist of eight 15-inch guns, and perhaps double that number of 6-inch guns. The cost of each vessel when completed will exceed two millions sterling. Messrs. Wm. Beardmore & Co., Ltd., Dalmuir, whose price was the lowest of all the tenders—although only £2,000 separated the highest from the lowest—were at first reported to have been given the contract, but later information made it clear that the Fairfield Company had been favoured. The Admiralty on this occasion have adhered to their policy of recent years by taking into consideration other circumstances, apart from price, such as the amount of work on hand in each yard, and the position of each firm with regard to speed delivery. Messrs. Beardmore & Company have at present in hand two battleships and three light armoured cruisers, whereas the Fairfield Company have only one of each on hand, the 25-knot battleship *Valiant* on the stocks, and the light armoured cruiser *Undaunted*, launched just over a month ago.

Abridgments of New Patents.

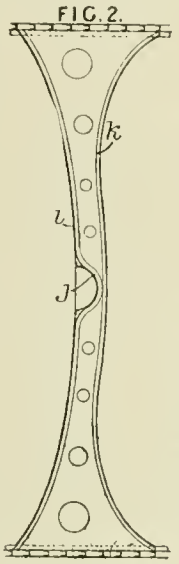
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

62. Steam-superheaters. A damper arrangement for use with the superheaters of locomotive, marine, and like boilers

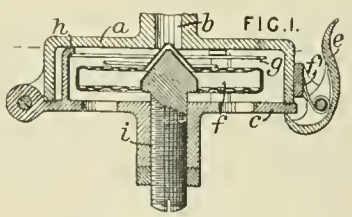


consists of plates *b* pivoted centrally at their ends and operated simultaneously by a handle *h* and levers *c*. The edges of the plates are formed with lips to facilitate their being moved correctly into the closed position.

129. Steam-traps. A casing having a removable cover contains an expansion-device, which is retained in its place by a spring when the cover is opened. The trap shown consists of a casing *a* having an inlet *b*, with a hinged cover *c*, against which an expansion capsule *f* is held by a conical spring *g*, the outside turn of which is held in hooks *h* on the cover. The capsule may be adjusted by a screw *i*. The cover is retained in the closed position by a catch *e* hinged to the casing and controlled by a spring *f*¹ coiled on the hinge or otherwise arranged. Otherwise the capsule may be held against the fixed casing *a*.



Patent No. 900.



Patent No. 129.

900. Ships. Bulkheads.—Consists in providing bulkheads *i* with stringers *k* attached thereto and to the sides of the ship, the stringers being widened at their ends as shown. In addition, hollow buttresses *j* are secured to the bulkheads. Modifications are described in which the bulkhead is of double convex form, and in which the stringer *k* and buttress *j* are duplicated. The bulkhead may also be corrugated in addition to being curved.

REVIEWS.

Screw Propellers and Estimate of Power for Propulsion of Ships. By Captain Charles W. Dyson, U. S. Navy. London: Chapman & Hall, Ltd. Price 31/6 nett; two volumes.

THIS is a disappointing book, as its price and excellence of production give rise to expectations which are not fulfilled on its perusal. Statements which are well-known facts are advanced as being the author's deductions from his calculations, and theories of world-famous experts in this class of work are treated in a few sentences and then put aside as being of no further use. The author's formulæ appear to lead nowhere. For instance, the first formula on page 69 cancels out to two constants, thus giving a constant diameter for the screw, whatever the case in question. Each formula on the same page appears to give a result on a par with the above. Only a few cases of modern practice are touched on, and practically no allowances are made for the design of multiple propellers, as in the case of a turbine installation, while the remedy for cavitation is not dealt with. The author uses for the formulation of his constants and formulæ, data based on the trial results of a very large number of vessels, which differ considerably, rather than on the methods of Froude, Taylor, Chase, Durand, etc., who, for the basis of their deductions, rely almost entirely on model experiments. Any practical designer who has had experience of the conditions under which trial data is obtained, considers it to be almost impossible to evolve any accurate method of design from such data.

Elementary Graphic Statics. By John T. Wright, A.M.I.MechE. London: Whittaker & Co. Price 4/- nett.

THIS work is a text book which can be recommended to students in search of a working knowledge of the application of graphical methods to the solution of the simpler problems met with in engineering and building construction practice. It is somewhat remarkable that in the twentieth century, having regard to the tremendous advance in the scientific treatment of technical subjects, that a certain number of people still scoff at graphical methods for solving problems, but the scoffers must surely lose sight of the fact that th

science of graphics presents a ready means of circumventing the many intricate and cumbrous mathematical equations which can all too easily, to those who are not mathematically brilliant, clothe comparatively simple problems with an air of mystery and difficulty. We are sure that the book written in simple and concise language, such as the one under review, will serve not only as a time-saving factor but will enable many students and engineers to tackle problems with much greater confidence than they would do in any attempt they may make to deal with the subject under more difficult circumstances. As a lecturer on graphic statics the author knows full well the limitations of the average student, and he has met the problem in a very satisfactory and comprehensive manner.

Electric Circuit Theory and Calculations. By W. Perren Maycock, M.I.E.E. London: Whittaker & Co. Price 3/6 nett.

THIS book on electric circuit theory and calculations may be used as a supplement to the well-known books on "Electric Wiring, Fittings, Switches and Lamps" and "Electric Lighting and Power Distribution," by the same author. The purpose of the present work is to explain the theoretical principles underlying numerical problems relating to electric installation circuits, and to show how such problems may be worked out. The various features are dealt with on a sectionalized basis, numbering in all 116, and the practical matters dealt with are of equal concern to the engineer who is connected with, but who is not too well versed in, electrical matters, the electrical-engineering student and the electric-installation contractor. It may be pointed out that the ground covered by the book is practically that embraced by the requirements of the Grade I., and final examinations in "Electric wiremen's work" of the City and Guilds of London Institute. The whole treatment of the subject is quite in conformity with that which has characterized the author's earlier works, and students will find the explanations and diagrammatic representations of the problems such as will enable them, with ordinary intelligence, to appreciate the points to be arrived at in each case. In order to make the book as complete as possible for the class of person for whom it is written, a special self-contained part on arithmetic has been included, so that those who are working in this particular subject should have no difficulty in working examples after a preliminary perusal of this particular portion of the work.

Verbal Notes and Sketches for Marine Engineers. By J. W. M. Sothern. Glasgow: James Munro & Co., Ltd. Price 12/- nett.

This publication is too well known to need much comment from us here. The 8th edition, which is now under notice, has followed the 7th within two years. It has been enlarged, re-written and many illustrations added. There are now 545 illustrations in the volume, all of which are up-to-date and a great number of them original, and an appendix has been added referring chiefly to Diesel oil engines, boilers and marine turbines, the latter including exhaust turbines and geared-down turbines, thus bringing the work right up to the latest practice. The sections of the book are arranged as follows—workshop practice; boilers; notes and sketches of various details, dealing with crank pin lubrication, reversing gear, stern tube, condenser tubes, air pumps, etc.; slide valves, piston valves, valve data, etc.; marine engineering chemistry notes; marine electric lighting; propellers; refrigeration; internal combustion engines. In this manual of marine engineering practice there are 676 pages, the information is well arranged and it can be confidently recommended to naval and mercantile marine engineers of all grades, students and foremen engineers.

The Naval Pocket Book, 1914. London: W. Thacker and Co. Price 7/6 nett.

THIS little publication, now in its nineteenth year, has been revised and brought up to date. It gives lists of the fleets of the world, all carefully classified, tables of guns, dry docks of the world, and a comparative summary of the fighting fleets of the nations. A special feature is the section showing the plans of a great number of vessels. Though small in size, by using thin paper, over 700 pages are found within the covers, and a wealth of information concerning naval matters is presented to the reader. All corrections and additions have been taken in up to the 8th of April this year.

The Dock and Harbour Engineer's Reference Book. By Brysson Cunningham. London: Charles Griffin & Co., Ltd. Price 7/6 nett.

The present work is a handbook which the author has arranged in a compact and convenient manner, notes which he has collected very largely for his own use and which he thinks very properly will be found of some general utility. The book is of pocket size and comprises some 310 pages. There are, of course, many pocket books which have been compiled from time to time, formulæ tables, and other material useful for reference. It may be said generally that they cover a range of subjects too wide for treatment in detail, and few, if any, give any systematic form, particularly of work actually carried out, while the important question of cost is hardly attacked. If any information is given it is found to be of so scanty a character as to be of little value. This is not so with the book under review, which contains information of a valuable nature divided into eight sections under the following headings:—General Administrative, Nautical and Physical Data; Cost of Dock and Harbour Systems; Harbour Construction; Dock Construction; Quay and Dock Walls and Wharves and their Equipment; Locks, Graving Docks and Floating Docks, and their Equipment; Dredging and Sub-aqueous Rock Removal, and Maritime Canals, Channel Rectification, Channel Demarcation and Coast Defence. From the foregoing it will be seen that the work is a very useful publication.

RAMSGATE NOTES.

(*From a Correspondent.*)

TRINITY HOUSE: CLOSING OF RAMSGATE STATION.

RAMSGATE is much concerned at the decision of the Trinity House authorities to close the depot there and remove the control to Harwich. The Ramsgate station has for years past been the headquarters of the four Goodwin lightships, the *Varne* and the neighbouring buoys. Until this year there has never been the least question raised as to the suitability of the station, but early in the year it was announced that it was to be closed and the district worked from Harwich. To the protests of the local Chamber of Trade and harbour master, the Corporation replied that every consideration of efficiency and economy demanded the change, and later added that the increased size of modern buoys rendered the use of larger steamers imperative. It must be admitted that the Harwich steamer is too large to use Ramsgate harbour conveniently, but there is certainly nothing on the district that could not be handled with ease by a steamer of 250 tons, the size of the late tender. Unfortunately, she was a most unhandy vessel, doing everything that a ship should not do, but surely that was a matter of changing the steamer, not the station. As an example of the new state of affairs, some days ago the light on N.W. Gull gas buoy blew out. Within twenty minutes steaming of Ramsgate it was necessary to send a steamer from Gravesend to relight it. It was a calm night and it was working again soon after sunset. But had it been blowing strong from the south-west it is probable that it would not have been lit before morning. And this, guarding a dangerous point on the Goodwins. The spectacle of the Harwich tender lying in Folkestone harbour waiting for a lull in the weather to relieve the *Varne* lightship will no doubt become familiar to ship masters next winter, and it must be remembered that the Trinity steamers have very little accommodation for more than their own crew.

"THE TSIROPINAS."—At 6 a.m. on Thursday, April 30th, the Ramsgate tug *Aid* and lifeboat went out in response to the signals of the Greek steamer *Tsiropinas* (ex *Cairngorm*), 3,015 tons gross, which was ashore on the outer Goodwins, and succeeded in getting her off on the rising tide. The *Aid* afterwards towed her into Dover, where the damage was found to be slight. Considering the sea that was running at the time she had a very lucky escape.

INSTITUTION OF NAVAL ARCHITECTS.—The summer meeting will be held in Newcastle-on-Tyne, July 7th to 10th.

SOUTHAMPTON "TITANIC" ENGINEERS' MEMORIAL.—Photos, picture post-cards and enlargements of unveiling ceremony. Enquiries to Publisher, Marine Engineer, 3, Amen Corner.

The Marine Engineer

And Naval Architect.

LONDON, JULY, 1914.

SAFETY OF LIFE AT SEA.

IT is somewhat pathetic that the second reading of the Merchant Shipping (Convention) Bill should be passed by the House of Commons so soon after the occurrence of the second of the most appalling marine disasters in the world's history. It will be remembered that this Bill is the product of the International Conference on Life Saving at Sea, to which so much emphasis and stimulus was given by the loss of the *Titanic*, but by this we do not mean that the conference would not have taken place if this disaster had not occurred, as the necessity for international discussion on the subject had long been recognised, and the loss of the *Titanic* only speeded up the fulfilment of the expressed wishes of the representatives of various nationalities that improvements should be made in the construction and equipment of ships to increase their safety and protect life and property at sea. We cannot, of course, discuss the disaster to the *Empress of Ireland* until after the close of the enquiry that is now proceeding, but it is permissible to observe that some of the views which were formulated at the *Titanic* enquiry and subsequently by experts in reviewing the matter will have to be reconsidered, particularly in the direction of the effectiveness of the policy of "boats for all," which in our opinion had too much prominence given to it, so that it came to be almost a fetish to the lay members of the public, who could not be expected to appreciate the controlling factors of the problem. Having regard to what the other nations, who are parties to the Convention, are doing, it follows that we, as the greatest maritime power, could not allow any serious delay in giving legislative expression to the terms of the Convention. The President of the Board of Trade emphasized his arguments in moving the second reading of the bill by quoting some figures and expressed the view that the effect of the legislative provisions would be to materially reduce the number of preventible casualties and the avoidable loss of life. It is significant to note that during the past twenty years no fewer than 4,700 British-owned vessels, aggregating three millions in tonnage, has been lost, involving the death of 18,474 persons. During the same period the ratio of lives lost has been steadily declining, and the ratio of crew to passenger loss is as three to one. While this is satisfactory in a sense, we agree with the President of the Board that the chief effect of the Bill will be to accelerate that decline more rapidly than it has been recently, largely owing to the effect of the two recent disasters on the figures of the period in question. The measure must obviously be acceptable to the nation as a whole, building as we do seventy per cent. of the capital ships of the world and owning sixty per cent., and as the President put it, it is not only its duty to keep abreast of invention and practical science, but it is its business, as it has been hitherto its pleasure and duty, to lead the world. The objects of the Bill are good, it harasses no one and interferes with no trade, but on the contrary it makes the carrying trade of the world as regards passengers, officers, crews and goods as safe as the present knowledge can make it. It is, we feel sure, a national wish that our mercantile marine shall not only be larger and stronger, but also swifter, and at the same time that those "who go down to the sea in ships" shall have greater safety and protection compared with present conditions. In the discussion on the Bill some important points were touched on. The first was that in the past the British shipowner, who had by new methods of ship construction, by the provision of additional safety apparatus, by the employment of wireless telegraphy and by putting on extra servants to safeguard the lives of those committed to their care, felt that he was somewhat penalized for living up to his responsibilities owing to the extra expenditure involved, and thus placing him at a disadvantage in competition with the rest of the world. He has now the consolation of knowing that while having credit for having done what he has off his own bat in the past, the International Convention has now brought up his foreign competitors to the standard that he has set for himself and put him on an equality with them. The next point raised was the vexed question of control of deck cargoes, to which more mishaps at sea are assignable than appears in the usual returns, and it is important to note that the President of the Board of Trade stated that his department had already decided on and was in process of calling an international convention to deal exclusively with deck loads. A good deal of criticism, which appears to us to be well founded, is directed to the point that the bill itself is only of a skeleton character, and the whole of the details are to be settled by regulations framed by the Board of Trade, for which power is taken in the Bill. This procedure savours too much of bureaucratic control, and much vigilance will have to be exerted to ensure that the authority of Parliament is not overridden by one of the Government Departments. A point deserving serious attention is that it should be obligatory and not merely discretionary upon the Board of Trade to see to the proper manning of passenger ships leaving British ports and that if the owner and the captain of a vessel are to be fined for not carrying out fire or boat drill, a certain penalty should be imposed on any member of the crew who refused to take part in those drills on the ground that it was outside his duty.

THE MARINE ENGINEER.

THE correspondence which has been proceeding in these columns for some months past indicates that there is a general feeling of dissatisfaction and disquietude among Marine Engineers regarding the proposed new Regulations of the Board of Trade in respect to the scholastic as opposed to the practical service work required of young men coming into the ranks of the engine-room staff. Our correspondents have entered their protests against the proposed substitutionary school-work for part of the practical service, and from the views which have been expressed to us by others in the course of discussing the subject and the possible general effect upon marine engineering practice, the school service as a substitution for any portion of the sea service is not approved by those who seek to maintain the highest standard of

efficiency. It has further been pointed out that when the new regulations were proposed, these were submitted to marine engineering societies, without any substitutionary clause, and if this is so, it appears somewhat strange that the Board should have omitted to consult the practical marine engineering societies on an important and drastic change in the regulations made subsequent to the consideration they were invited to bestow upon them. Cases have come under observation showing the relative values of practical engineering experience in the workshop and theoretical training gained at schools and colleges. In these cases the value of the former was manifestly higher in dealing with the carrying out of work in connection with machinery. There is no doubt that a combination of the two classes of training makes the best man, but if one is to be sacrificed it should not be the practical. Another point which has not been referred to by our correspondents is the injustice which may be unwittingly meted out to young men whose parents or guardians may desire to minimise the practical workshop service and take full advantage of the school work. It has been reckoned that two years' workshop service and the remainder made up in school may qualify a candidate for sea service, and subject to the examination, a marine engineer's certificate. This idea should not be encouraged, as it might prove detrimental to the whole future life of such a candidate. The superintendent of a Company looks to the workshop service certificate to guide him in selecting junior engineers and generally accepts those who have had five years' workshop service, in addition to their class certificates. Many will accept no less, hence it is well that a note of warning be given, that in endeavouring to minimise the practical workshop service, to make it easy to get through, the young man's future is jeopardized. It is a great mistake so to urge the easy way or make the way too easy. Let the young bear the yoke learn discipline and the way to handle tools, so shall they become men of grit and value in the engine room and in the world, whatever be their ultimate goal.

OIL FUEL FOR THE NAVY.

THE negotiations which the Government have been carrying out with the Anglo-Persian Company have been dealt with in a Parliamentary Blue Book issued about the beginning of last month. It will be remembered that the First Lord in dealing with the estimates for the Navy emphasized the importance of some arrangement whereby provision can be made for oil fuel, which will, without doubt, become an absolute necessity in order to secure the full efficiency of his Majesty's Naval service. Further, it was about a year ago that the First Lord stated to Parliament that a necessary part of the ultimate policy of the Admiralty must be that the Government should become the owners, or at any rate the controllers at the source, of at least a proportion of the natural oil which the Navy required, and to spread contracts for the supply as much as possible over widely separated fields, so that in time of war if some areas should be closed others will remain open. While it is not desirable to draw all our supplies from one source, it was essential that the fields over which His Majesty's Government will have control should be so developed that in times of emergency they will be able to supply, at short notice, any deficiencies that may arise through the failure of deliveries elsewhere. It can only be by such control that the State can ensure that prices shall not be artificially inflated by interested producers and marketing agencies, as the evident tendency for the oil fields of the world and the marketing of their products is to fall more and more under the control of a comparatively few large concerns. A large consumer like the Admiralty cannot place itself in a position of dependence for vital supplies upon a few companies whose interests are necessarily cosmopolitan and financial. It will be recognised that it is, therefore, important and essential in naval interests to secure that at least one large British oil company shall be maintained, having independent control of considerable supplies of natural petroleum, by financial and contractual obligations. It will be recognised that such an arrangement can hardly fail to have its effect, not merely on the supplies directly so obtained, but on the terms and conditions on which the whole of the Admiralty's requirements will be met, owing to the greater independence and bargaining power thus obtained.

In furtherance of this policy the Government propose to invest £2,000,000 in the Anglo-Persian Oil Company, and under the arrangements to be made the Government will hold the preponderating interest in the share capital. The price at which the Admiralty will obtain the oil itself is kept a secret, and the supply contract will be regarded in the public interests as confidential, but it would appear that provision is made for the supply for a term of years on a favourable scale of price of a reasonable proportion of the total estimated annual requirements of the Admiralty, on the present basis of policy of oil consumption and with due allowance for expansion. It must be understood that the contract is for oil only and the Admiralty will therefore make its own arrangements for transport. This procedure is, of course, a departure from the usual and must obviously have been carried out in connection with and under the authority of the Treasury, and it will be interesting to see how far the Treasury are prepared to go in the direction of Imperial trading for providing fuel for the Navy in the future. It does not appear to us to be correct to assume, as has been done in some quarters, that this deal has been effected for the purpose of supplying oil fuel for vessels in the Eastern waters only, as it is quite clear to us from the broad outline of policy involved, that having got a first claim to oil, for which the Admiralty no doubt would have to pay what is substantially the market price, they can ship that oil either to this country or any convenient basis where it is desirable to store it. We do not think that any level-headed business man will cavil at the foresight of the Admiralty or with their method of dealing with the provision of a necessity on which the efficiency of the Navy largely depends.

Although the agreement referred to is made, signed and sealed, it follows that the necessary resolutions by the existing shareholders on the one side, must be passed, and on the other the funds needed for giving effect to it must be provided by Parliament. We understand that a financial resolution and a Money Bill are in the ordinary course to be brought before Parliament for the latter purpose, the intention being to issue the Government capital by instalments as required.

SEAPLANES OF TO-DAY.—In the article under this heading in our June issue we described the Sopwith flying boat as being of Saunders' construction. This should have read of Sopwith construction.

The Anglo-Saxon Petroleum Co. have recently added to their fleet of oil tankers, the *Hermes*, built by Messrs. Palmer at Jarrow, to carry 5,000 tons of oil. She is fitted with two Diesel engines of the Werkspoor type. There are six cylinders in each set with a combined h.p. of 2,200.

WE are informed that the motor ship *Arum* has two Cochran (Annan) donkey boilers fitted for generating steam for the deck and auxiliary machinery. They are worked under natural draught and arranged to be heated either by coal, oil or by exhaust gases from the main engines.

A NEW dry dock, representing an important portion of the Port of London Authority's improvement, was brought into use for the first time when the Cunard boat *Alaunia* was admitted recently. The dimensions of the dock are—Length 575 ft., width of entrance 80 ft., being 166 ft. longer and 15 ft. wider than the one which previously occupied the site.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondents.)

Further Shipping Amalgamations.

THE announcement that the Sir Stephen Furness, M.P., Line, in conjunction with Mr. A. H. Read, of Liverpool, has purchased the share capital of the British and Irish Steam Packet Co. has an importance beyond the amount of the necessary capital involved. That is not a great sum. The authorized capital of the purchased Company is only £120,000, and of that amount some ten thousand pounds seems to be unissued. But there is a sentimental interest in the matter in that the British and Irish is one of the oldest steamship companies in the world. It will always be remembered as the owner of the steamship *Sirius* which was despatched a few days before the famous *Great Western* on the New York voyage, and which thus became one of the pioneers of transatlantic steam navigation. But there is a further substantial interest in the matter from the fact that each of the purchasers is already largely interested in the coasting trade. Mr. Read is the chairman of the Powell-Bacon-Hough Line recently formed by the combination of the three Companies whose names are indicated by its title. The fact that their chairman is interested in the purchase, together with Sir Stephen Furness, is a fairly clear indication, not only that the British and Irish will be worked in connection with the Liverpool company but also that the Furness steamers will make amicable arrangements with both.

The British and Irish owns some half dozen steamships, of which the finest is the *Lady Gwendoline*, of upwards of 2,100 tons gross register. She is about three years old, and there are four other passenger vessels all well over 1,300 tons gross. In addition there is a smaller vessel, but whilst the others are engaged in the combined passenger and cargo trade the last-named ship is employed in the freight service only. It is understood that no change will be made in the title or the working of the purchased business.

Another, and of course far more important *approchement*, is that of the P. & O. and British India Companies. It is not so long ago that these two organizations were rivals for the honour of being the posessors of the largest tonnage in the British mercantile marine, and though amalgamations and absorptions in other directions have given other companies somewhat larger fleets, each of them is still quite in the front rank. Briefly and roughly it may be said that the P. & O. is mainly an over-sea business, whilst the British India is mainly a local trader. Whilst this statement is broadly true, it must of course be remembered that the P. & O. has its local services and that the B.I.S.N. Co. has many fine steamships engaged in main line traffic. But the fact remains that in a certain sense the business of the two companies is complementary one to the other, and accordingly the union may be of great advantage to them in enabling them to arrange their services with a due regard to economy and extension, whilst it will assuredly strengthen the hands of the united management in meeting the severe competition which may certainly be anticipated in the Far Eastern trade, for the German lines, headed in point of daring, if not in actual tonnage power, by the Rickmers line of Hamburg, are making their influence severely felt in these trades. On the other hand, the Japanese are uniting their forces with a view to wresting some of its business from the Red Ensign. To this end it is reported—though as yet there is no official confirmation of the rumour—that the Nippon Yusen Kaisha is about to absorb the Osaka Shoshen Kaisha and the Toyo Kisen Kaisha—lines only second in importance to itself, the latter indeed having in its fleet steamships of upwards of 13,000 tons apiece.

Moreover, the German companies, not satisfied with disturbing the security of the British companies in the Eastern trade, have, now that the Hamburg American Co. and the N.D. Lloyd have composed their differences, announced their determination of making steamship despatches from German ports to New Zealand. In this connection comes the announcement that the N.D. Lloyd mail service to Australia is not after all to be abandoned, the Reichstag having agreed to continue the subsidy to the Company on terms agreeable to it though not, it is understood, identical with those prevailing under the old contract.

The Month of May, 1914,

went out with one of the most terrible collisions which have ever been recorded in the annals of the British mercantile marine. The enquiry into the circumstances attending the loss of the Canadian Pacific steamship *Empress of Ireland* off Father Point at the entrance to the river St. Lawrence is still being held as we write, and our comments must therefore be reserved. But the broad fact remains that at about 2.30 a.m. on the morning of the 29th May this fine vessel, which only an hour before had shipped the eastward Canadian mails at Rimouski, came into collision with the inward-bound Norwegian collier *Storstad*, bringing some 10,800 tons of coal from Sydney, Cape Breton, for Montreal. The liner carried, according to the latest estimates, 1,477 persons, and of these only 463 persons were saved, the dead being placed at 1,014 souls.

415 crew	241 saved,	174 lost.
87 saloon passengers ..	36 ,,	51 ,,
253 second-class	48 ,,	205 ,,
717 third-class	133 ,,	584 ,,
Total 1472 on board.	458 saved,	1014 lost.

The circumstances of the case explain the obvious fact that a large proportion of the saved were members of the crew, for the ship had only commenced her voyage at 4.30 p.m. on the previous day, so that all the passengers, who were in their first sleep, found themselves in an unfamiliar vessel, and in the short time afforded to them had no chance to find their way on deck, for the lights went out soon after the contact. Many members of the crew were, of course, on deck in the ordinary course, and at the first alarm all hands were summoned to assist in, if possible, the saving of the ship or at all events in launching the boats. What is certain seems to be this, that the *Empress* had left Rimouski about an hour before the catastrophe, which apparently took place some six and a half miles from Father Point, and some two miles from the shore. The *Storstad* was first sighted when distant some six miles, then the fog came down, each ship manœuvred, gave sound signals, sent various messages to its own engine-room and then got into such a position that Captain Kendall, of the *Empress*, sighted the other vessel 100 feet away bearing at right angles to the liner's course, and with all her three navigation lights showing. It was then realized that a collision was inevitable and such measures as commended themselves were taken to minimize the blow. No one as yet seems to know what the exact injuries to the *Empress* were. She was struck between the funnels—a vast hole being made here and two compartments being knocked into one. The further damage sustained by the ship does not as yet seem to have been disclosed, if indeed it be known. It was said that the plates were stripped from her side right away back to the propeller. Anyhow she at once took a list which greatly interfered with the work of launching the boats and added to the loss of life by throwing one or more of the unlaunched craft off the decks and on to those which were in process of loading. It was by such an accident that Chief Officer Steele lost his life. Five minutes after the blow the wireless installation became useless, but fortunately in that time the operators had succeeded in calling up Rimouski and the tenders *Eureka* and *Lady Evelyn*, which had seen the mail steamer start so short a while before, were soon on the way to the rescue. The colliding vessel drifted off to a distance of nearly a mile, and examined her own damage which was, of course, serious forward. As soon as she realised the extent of the disaster to the *Empress* she put down her own boats and so was instrumental in saving a good many persons. But everything was against the rescue. Not only did the loss of power paralyze the wireless installation, but it defeated the idea of running the vessel into shoal water and it also put out the lights and left the ship in complete darkness. The icy coldness of the water killed many of those who leapt or were swept into the sea. But it seems clear from the statement of the survivors that the vast majority of those on board were drowned under deck. One cannot avoid comparing this disaster with that of the *Titanic* a couple of years ago. That, we were told, was so exceptional that the conditions were not likely to recur for a century. And two years after we have a catastrophe exceeding it in horror. True the number of victims is less, but that a collision should have taken place in a channel as wide as the

straits of Dover between vessels which were sighted six miles apart, seems, if one may say so, so unnecessary. People talk of the collision as an instance of the "dangers of the St. Lawrence." There ought to be no dangers, of collision at least, in this part of the St. Lawrence. There is the sea-room and vessels might be kept completely out of one another's way. It is only a question of making the requisite rules and—keeping them. The collision having occurred, and there being boats for all, the shore being but two miles distant, one would have thought loss of life impossible in a modern steamship. True the initial blow opened up two compartments, but the ship was designed to float in an ocean swell with two compartments flooded, and floating under such circumstances means keeping afloat for a period longer than that necessary merely to get away the boats. And ships can float under such conditions. Indeed, since the lamentable loss of the *Empress* the German liner *Kaiser Wilhelm II.* has been in collision. She too was struck on a bulkhead, but she made port safely enough, and the photographs taken on her arrival do not show by any means a dangerous list though it is appreciable enough. Had the *Titanic* after her terrible wound taken such a list as did the *Empress* of *Ireland*, the horror of the scene, and indeed the loss of life would have no doubt been greatly aggravated. The fact that the *Empress* turned on her side and sank within from fifteen to twenty minutes of the blow, seems to us to be the real disquieting thing about the collision. For the owners and masters of the two steamers the apportionment of blame is a serious matter enough. But the whole world is interested in the lesson to be learnt from the damage. People will make mistakes and collisions must from time to time occur. In consequence of the risks of navigation enormous sums of money are spent on boats, on life-saving appliances generally, and in the various aids to safety which modern science has from time to time evolved. We have heard of the unsinkable ship and we know that no ship is really unsinkable, given a large enough combination of adverse conditions, any more than any safe is really unopenable—given sufficient time and opportunity to the burglar. But one does imagine that a liner will give at least such time as did the *Titanic* before she succumbs to any blow, however severe, and for that reason the discussion of the injuries to the *Empress of Ireland* and of the measures taken to make use of her appliances is of universal interest and importance.

It should not be forgotten that an almost exactly similar collision took place just two years previously in very nearly the same position between the sister *Empress*—that of *Britain* and another big collier the *Helvetia*. As it was the latter which sank and as only money interests were involved it does not seem that any great regard was paid to the warning then given.

The Queenstown Call.

A Governmental enquiry is taking place as to the expediency or otherwise of retaining the call at Queenstown for big mail steamers. The evidence of those who represent the Cunard and White Star lines goes to show that no monetary consideration whatever will induce these shipowners to risk their big vessels in Cork Harbour. If they for reasons of safety decline to take ships of a certain size into a given harbour it will follow that no other shipowners will be found to enter where they fear to tread. Passengers now demand vessels of the size which cannot use Queenstown, and the statements of Mr. A. A. Booth have shown that the *Aquitania* is no larger than she had to be to afford what is wanted and be remunerative to those who invest their money in her. If the Government want mail steamers to call at Queenstown it would appear that they will have to build a special type of vessels themselves for the business. Meanwhile both the White Star and the Cunard Company give Ireland unusual facilities—they each make at least one call a week at Queenstown with passenger steamships of the highest class.

It is interesting to note that the trouble at Queenstown is by no means a thing of yesterday. As long ago as January, 1867, the Cunard steamship *Asia*, outward bound, arrived, as was then the custom, at Queenstown on Sunday afternoon for the shipment of the mails. But there were no mails forthcoming. It was not till the afternoon of the next day that she was able to get away. It may be explained that the delay was caused by a tempest—that in which the *James Crosfield* was wrecked on the rocky fangs of Langness with the loss of all on board. But the Cunarder got through to Queenstown all right and had she shipped her mails at Liverpool, storm or no storm, very nearly twenty-four hours would have been saved on the transit.

Disasters to Mail Steamers.

Beyond the outstanding disaster to the *Empress of Ireland* there have been an unusual number of passenger steamers in trouble. First of all there was the stranding of the *Waipara*, —a vessel which, if my memory rightly serves me, was ashore for some time at Brisbane in August, 1909. On the present occasion it appears that the vessel left Thursday Island for Cooktown on the morning of the 24th May. At 7 p.m. the same evening she grounded on Hannibal Island reef. The master sent a wireless message to the effect that she was ashore from her forefoot to No. 3 hold on the starboard side and was leaking in the forepeak. As there was good water all round not much was thought of the matter at first. But later on it was reported that she was badly ashore and making water. The s.s. *Cyrena* and other vessels stood by and H.M.S. *Fantome* was sent to her assistance from Thursday Island. The first attempts by these vessels to get her off failed, but after jettisoning a quantity of cargo she was got off at 9.30 p.m. on the 27th May, proceeding to Cairns for repairs. The *Waipara*, which was built by Messrs. Hawthorn, Leslie & Co. in 1894, is a vessel of some 6,393 tons gross.

On the 6th June there was the sinking off Charlton of the new steamship *Oriole* of the General Steam Navigation Co.'s fleet by collision with the Allan Line steamship *Corinthian*. The accident occurred soon after ten o'clock on the night of the 6th June when the *Oriole* was outward-bound for Hamburg, the ocean liner being inward-bound. How the collision occurred is not a matter for present discussion. But the *Oriole* being struck amidships heeled over, went on to her beam ends and at once sank. She lay absolutely on her side. Those on board had no time to take measures for the safety of the ship or of themselves, and either jumped, or were flung by the rolling over of the vessel, into the water. Fortunately they were all picked up by watermen. The sunken steamer formed a serious obstruction to navigation, but she was promptly dealt with. Four days after the accident she was got upright and three days later—just a week after the collision—she was floated. This promptitude in dealing with a 1,500-ton vessel, so awkwardly placed, reflects the greatest credit on those who had the conduct of the operations.

On the afternoon of the 18th June in a dense fog the Nord-Deutscher Lloyd steamship *Bulow*, homeward-bound from Japanese ports with some 240 passengers, went ashore on Blackmoor Point to the west of Portland Bill. She had been feeling her way for some time and having lost her bearings went on to the rocks broadside. Wireless calls were at once sent off for help, which was soon forthcoming from Weymouth and Portland. The passengers were quietly transferred with their baggage to a Weymouth tug, and those who elected to proceed direct to London reached Waterloo but twelve hours late. The assisting vessels made efforts to get the vessel—which was already holed forward—end on to the shore. This they did not succeed in doing till a certain quantity of cargo had been transferred to lighters. On the 19th June the efforts of four tugs brought the liner off, and she proceeded to Southampton for docking and the reshipment of the discharged cargo.

The same Company's steamship *Kaiser Wilhelm II.* was seriously injured by collision on the afternoon of the 17th June when some few miles outside the Needles on her voyage to Cherbourg and New York. In a dense fog she was struck amidships on the starboard side by the bows of the 3,000-ton steamship *Incemore* of Liverpool. The Liverpool liner was on her voyage from Braila to Antwerp. Holes of considerable size, extending for some distance below the waterline, were knocked in the *Kaiser's* side. But though they destroyed the efficiency of at least one of her bulkheads, the liner stood the ordeal well. It appears that as soon as the fog came down the master had closed the bulkhead doors throughout the ship, and, thanks to the arrangements with which these ships—like those of our own Cunard Company—

are fitted, he knew that what he wanted was done. There is in these ships no giving at a vital moment orders which may or may not be carried out by panic-stricken men—or which indeed may, owing to the ingress of water, be incapable of being effected. A collision mat was at once placed over the wound and the *Kaiser* put back to Southampton. Those of her passengers who desired it were sent forward next day by the *Imperator*. The divers report that there are two holes in the *Kaiser's* skin. One is 24 ft. long and 5 in. wide and the other 9 in. wide and 18 ft. long. These injuries opened to the sea a bunker and a boiler compartment. But the other bulkheads had been rendered efficient by the closing of the doors and they fulfilled the duty for which they were designed by confining the water to the injured sections. The ship's pumps had plenty of steam from the boilers in the uninjured sections and the ship easily made Southampton under her own steam.

Photos have been published showing the severity of the injuries and also indicating the extent of the list which she took. In view of the recent instances of failure to float after underwater injuries the present accident is really reassuring.

A similar accident to that which befell the *Kaiser Wilhelm II.* had previously happened to the American liner *New York*, save that whilst the 19,000-ton *Kaiser* was rammed by a vessel of but 3,000 tons, the *New York*—whose tonnage is about 10,000 gross—was struck by the Hamburg-American liner *Pretoria*, of something over 13,000 tons. The momentum of the blow received by the *New York*—supposing that the speeds were equal in each case—must have been much heavier, whilst she is of but half the size of the *Kaiser*. It was at 3.26 a.m. on the morning of the 13th June when the *New York*, bound from Southampton—which port she had left on Saturday, the 6th June—to New York was some 400 miles east of the United States coast that she was struck in fog by the *Pretoria*, then eastward-bound. Fortunately at the time of the contact the *New York* had heard the *Pretoria's* whistles and had stopped. Indeed before she was actually struck, her engines, though not the ship, were in fact going astern. The bows of the *Pretoria* struck her some 50 ft. from the stem and cut into her to a depth of 12 ft. As luck would have it, though the hole cut in her plating by the German's bows was some 32 ft. long, the damage was entirely confined to above the water line. Having ascertained that the *New York* was in no danger, the *Pretoria* proceeded on her voyage whilst the *New York* made her destination without further incident or trouble.

Shipyard Management Changes.—It has recently been intimated that Mr. Alexander W. Sampson, who has been manager of the shipbuilding section of the Fairfield Shipbuilding and Engineering Co., Ltd., Govan, for the past fourteen years, has resigned from that position, and that Mr. Hugh M. M'Millan, the present general manager of Messrs. Workman, Clark & Co.'s shipyards at Belfast, is joining the Fairfield Company as Mr. Sampson's successor.

Engineering Models.—A loan exhibition of engineering models promoted by the Corporation of Glasgow was opened to the public in the Museum and Art Galleries, Kelvingrove Park, Glasgow, on May 29th. Including the permanent Kelvingrove collection of engineering and shipbuilding models the exhibition comprises about 300 exhibits. Nearly 100 loan exhibits consist of models sent in by artisans and amateur engineers, and in this section of the display about £50 have been distributed in prizes. The object of the exhibition is to increase the interest in and usefulness of the engineering section of the museum, and also to give some encouragement to those who devote their spare moments to the study of mechanical problems and the construction of models of machinery and mechanical devices. In the course of the opening proceedings reference was made to the Institution for Model and Experimental Engineering, which was opened over a year ago in Govan, and which has made gratifying progress since, both in membership and in work accomplished. The Institution is well equipped with machine tools, and is patronized by the workmen—especially the apprentices—employed in the engineering works and shipyards of Govan and neighbourhood.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondents.*)

Portsmouth Dockyard.

ALTHOUGH it will not be until March next that a change will fall due in the post of Commander-in-Chief at Portsmouth, it is understood that the successor of Admiral the Hon. Sir Hedworth Meux has already been chosen, in the person of Admiral Sir George Callaghan, now Commander-in-Chief of the Home Fleets. The latter officer is being relieved by Vice-Admiral Sir John Jellicoe in December, on completing his three years in command, and after the eight years during which he will by that time have been serving at sea continuously as a flag officer in command of squadrons, he will be thoroughly deserving of his appointment to the Portsmouth command. Few officers have so well earned the *otium cum dignitate* of a port admiral as "Uncle George," as he is popularly known by the bluejackets, and there could be no more fitting choice of a successor to Sir Hedworth Meux. Sir Hedworth is not leaving on account of the expiration of his three-year term, as it was only on July 30th, 1912, that he hoisted his flag in the old *Victory*, but he will be promoted to the Navy's highest rank of Admiral of the Fleet on March 5th and must therefore make way for another man, as it is against the custom of the Service to employ an officer of equivalent rank to field-marshal in a port command. There was some disappointment locally that the French squadron which arrived on June 13th went to Portland instead of coming to Spithead, where it could have been so much better entertained, but as the visit was not of an international or festive character this consideration did not influence the authorities. Admiral Rouyer's squadron simply called during the course of an exercise cruise and to return the visit of our ships to Brest and Cherbourg a few weeks back. Sir Hedworth Meux was happily inspired to send a division of six submarines from Portsmouth to meet the French visitors, in whose squadron there were also six submarines—the first time such a flotilla from a foreign fleet has visited this country. The British boats, "*D1*" to "*D6*," being of 604 tons submerged displacement, were larger than the 400-ton vessels of the *Ventôse* type in the French division, but the latter were remarkable for the six or seven torpedo tubes with which they were fitted. It was interesting also to find that they were steam-driven on the surface, whereas the British boats are propelled by heavy oil engines. An unfortunate accident occurred to seaplane No. 128 on June 4th, causing the death of two promising officers. The machine was flying over Southampton Water piloted by Lieutenant T. S. Creswell, R.M.L.I., with Commander A. Rice as a passenger, when for some reason at present unexplained it plunged into the sea, drowning both men. When found, the wreck of the machine showed the controls to be in perfect order, and there was nothing to show, as was at one time presumed, that an explosion of the engine had occurred. Unlike the military wing, the naval branch of the Flying Corps has been comparatively immune from accidents involving loss of life, and only four other officers have been killed, of whom three were not flying naval machines at the time. Our construction work is progressing steadily and on the whole satisfactorily. It is officially announced that for the battleship to be laid down on the slip from which the *Royal Sovereign* is to be put afloat in the autumn the name of *Agincourt* has been chosen. As has been stated in these notes, the coming ship will be of the "Queen Elizabeth" type, making six vessels in this oil-fired class. Captain J. E. T. Harper, Assistant King's Harbourmaster, has been appointed Master of the Fleet from June 10th to July 27th. Such an appointment is only made on occasions of great assemblies of ships for manœuvre or review purposes, and indicates that the fleet which will gather before July 18th, when the King is coming down for an inspection, will be a big one.

Devonport Dockyard.

On Tuesday, June 2nd, the new battleship *Marlborough* was placed in commission, and the sixth "Dreadnought" to be built at Devonport thus formally became a unit of the

sea-going fleet. A week later, the vessel's crew was completed to full numbers, and on June 22nd she hoisted the flag of Vice-Admiral Sir Lewis Bayly for service as flagship of the First Battle Squadron. Although not built quite so quickly as most of her predecessors, the *Marlborough*'s construction reflects great credit upon all departments of the yard. She is a fine ship in several respects, and makes a valuable addition to the squadron she has joined. Being named after the great Duke of Marlborough, the present members of the family have shown an intimate interest in the vessel's progress, and have made many presentations to her, such as an old oak bust and framed picture of the duke, an autograph letter signed by him, and the like. Each of the ten 13·5-in. guns has also a smart brass cap with a crest in the form of a bust of the duke. The *Warspite*, which followed the *Marlborough* on the building slip, is making good progress in the fitting-out stage, and in favourable circumstances should be ready for service within six months. The *Royal Oak* is also making headway on the stocks. Her launching date has been provisionally fixed for November 17th, when she will have been on the slips about as long as were the *Centurion* and the *Marlborough*. After her launch, the battleship of the current programme can be begun, and the circumstance that this new vessel is to be a sister-ship to the *Royal Oak* should facilitate her construction. She will be called the *Resistance*, a name in keeping, it will be noticed, with the rule now obtaining that ships of the same class should have names with the same initial consonant, all the names of vessels of the "*Royal Sovereign*" type beginning with "R." In addition to the battleship programme, we have the two light cruisers *Aurora* and *Cleopatra* in hand, the former completing afloat and the latter on the stocks, and there are also the oil-tank vessels *Carol* and *Ferol*, one afloat and one on the slips. The *Ferol* is now ready to be launched, and may take the water any day, but the function will be of a private character. The completion of these two and the four other oilers under construction elsewhere in the next few months will be an important event in the development of the use of oil fuel in the Navy. Different types of propelling machinery and various designs of valve gear are being fitted in these oilers, which will constitute an experimental squadron whose working should provide the authorities with valuable information. No doubt before many months are passed we shall have some of the vessels running backwards and forwards to the Navy's new oil-field in Persia. The *Carol* several weeks ago had her master appointed in the person of Mr. J. D. Ashworth, who was formerly in charge of the oil-carrying vessel *Kharki*. These vessels are not, of course, commissioned as men-of-war in the ordinary sense, but are classed with the Royal Fleet auxiliaries—tugs, tank vessels, hospital ships and the like. The cruiser *Highflyer* has come back to Devonport after her cruise to the Mediterranean, the first which she has made since being appropriated for duty as training ship for the cadets specially entered from the public schools. The association of Devonport with the training work of the Navy, both as regards officers and men, is a wider one than that of the other yards, for not only are the cadets' cruisers based on the port, but the three hulks known as the *Impregnable* and the three known as the *Powerful* share with the establishment at Shotley, near Harwich, the work of training boys on their first entry. On June 15th, the office of the Rear-Admiral in charge of the boys' training service was removed, owing to the growth of the service, from the *Powerful* to offices within the Admiralty in London,

Chatham Dockyard.

The principal event of the past month, which has been a very quiet one, has been the commissioning of submarine *E8* for duty in the Eighth Submarine Flotilla at Portsmouth. This took place on June 16th, and synchronized with the controversy aroused by the letter of Sir Percy Scott in the "Times" on the menace of the submarine. Evidence of the growth of the under-water boats in the British Navy is afforded by the design of *E8*. Much larger boats are in hand, but it is significant that when Chatham Dockyard was first entrusted with the building of submarines seven years ago the newest class was the "C" class, of 313 tons submerged displacement and 600 horse-power on the surface, giving a speed of 13 knots. The "D" class advanced to 604 tons displacement, 1,200 horse-power, and about the same speed, but the "E's" have a displacement of 800 tons, and their engines of 1,600 horse-power give them a speed of 15 knots. They are 176 ft. long, as compared with the 135 ft. of the "C" boats. Were it possible to publish the dimensions and other particulars of the still later boats, the development would be seen to be enormous. The completion of *E8* leaves us with *E12* and *E13* and *F1* in hand. *F1* is supposed to have been the boat in regard to which a German paper, the "Zeitung am Mittag" published an interesting description in April last. It was stated that the submerged displacement of the boat was 1,500 tons; she had oil motors of 6,500 horse-power giving a speed of 24 knots on the surface, and electric motors of 2,400 horse-power giving 18 knots when submerged; her radius of action above water was said to be 2,800 knots, and below water 900 knots, so that she "could travel unseen from London to Hamburg and back, without recharging her accumulators"; there were eight 21-in. torpedo tubes and two 4-in. disappearing guns; the complement included fifty-two officers and men; the accommodation was comfortable, including double cabins for officers, and an electric range for cooking; and each person on board was said to be supplied with a safety helmet, electric torch, thermometer, morse alphabet and a hammer for giving sound signals. Of course, there is no way at present of ascertaining how far this pretty story is true, and it can only be remarked that straws show which way the wind blows. Of the two oil-carriers under construction at Chatham, the second was launched on May 27th and named the *Servitor*. The ceremony was of a private character, and the christening of the vessel was carried out by Mrs. Rawlingson, the wife of Engineer-Captain W. W. H. Rawlingson, manager of the engineering department of the dockyard. The *Attendant*, the other oil-carrier, which was launched last year, is making progress towards completion, and Lieutenant William Gregory, R.N.R., has been appointed master of the vessel. Refitting work has been quiet lately, and at the moment of writing only one ship of the First Fleet, the *Lowestoft*, is in port. The *Lowestoft* was one of the vessels chosen to make the cruise to Reval, Cronstadt and Riga with the First Battle-Cruiser Squadron, but the *Blonde* was afterwards substituted for her, owing, it was believed, to the wish of the Russians that the light cruisers might come up to St. Petersburg, for which journey the *Blonde* is better fitted as she draws over two feet of water less than the *Lowestoft*. The success of the Chatham teams in that popular feature of the Royal Naval and Military Tournament, the inter-port field gun competition, was very gratifying to all ranks and ratings here. It was no easy task to capture again the inter-port cup, but smartness and skill combined succeeded in doing so. Congratulations are due to the commanding officer of that venerable craft, the *Bustard*, on his promotion to commissioned rank. Lieutenant James Cadogan, who has been in charge of the vessel since March, before which he was for three years president of the warrant officers' mess at Sheerness depot, joined the Navy as a boy nearly forty years ago, and was promoted to warrant rank as a gunner in May, 1892. The *Bustard* is one of the early gunboats of the Navy, having been launched as far back as 1871. She carries an 8-in. gun, and is used chiefly for gunnery experiments.

Sheerness Dockyard.

An empty harbour and yard is the result of the summer cruises, which are in full swing at the moment of writing. There has been no ship of the First or Second Fleet here for several days. We expect several will return, however, after their visits to Germany, Russia, Norway and elsewhere for a few days before the assembly at Spithead on July 18th, when the King, all rumours to the contrary notwithstanding, is to travel to Portsmouth and spend three days among his ships and sailors. There will not be a "review," for the pomp and formalism of which the King has little or no regard, but it may be taken for granted that his Majesty will inspect several ships and accompany the squadrons to sea. The activity of the fleets extends not only to the fighting squadrons proper, but to the mine-laying and mine-sweeping flotillas, the former being on a cruise off the west coast of Scotland, and the latter off the west coast of England and the vicinity of the Bristol Channel. If reports are to be believed, the mining service has advanced in efficiency

of late, and its activities are increasing, so that it would not be surprising if some more vessels were fitted for duty in this connection. The battleship *Queen*, one of the ships of the Second Fleet at the Nore, and until recently flagship of the Vice-Admiral Commanding, relieves the *Duncan* as gunnery training ship at Portsmouth, as the latter is due for a lengthy refit, and the change will thus make a reduction of one in the total of armoured vessels in the local division. This should not be for long, however, as when the *Emperor of India* and *Benbow* are ready for delivery by the Vickers and Beardmore firms respectively, the authorities will be able to spare some older vessels from the Fourth Battle Squadron. The great progress made by the aerial branch of the Navy, which has its head-quarters at Sheerness sub-depot, has received an interesting illustration in the despatch of two of its officers to Somaliland in connection with a proposal to utilize the services of aircraft in an expedition against the Mullah. The officers who have gone to Berbera are Lieutenant-Commander F. L. M. Boothby, who has been commanding naval airship No. 4, of the Parseval type, and Lieutenant R. B. Davies, second-in-command of the Naval Flying School at Eastchurch. They represent both branches of the air service, Lieutenant Davies being an aeroplane officer. The Colonial Office naturally deprecates anything being said at present in regard to the scope and nature of the proposed action in Somaliland, but in due time details of the operations will be received with interest. The old cruiser *Egmont*, which was originally the ironclad *Achilles*, launched in the 'sixties, has been brought here in tow of the battleship *Britannia*, and the Admiralty are considering what use they can put her to. On the one hand, it is said that she will provide accommodation for the Naval Flying Corps, relieving the shore depot in this respect; on the other hand, the torpedo school in the hulk *Actæon* needs a new home, especially after the big fire in the vessel just before Christmas, and the *Egmont* would serve this purpose very well. The hulk will have been examined shortly, and her ultimate service made known.

Pembroke Dockyard.

A good deal of attention has been attracted by the announcement that the cruiser *Terrible* has been ordered to be paid off from the Third Fleet at this port and sent to the Motherbank, Portsmouth, prior to being sold. The passing out of commission of Sir Percy Scott's old ship has thus occurred about the same time that his pronouncement in regard to the future of the submarine and the doom of the battleship has awakened the interest of the whole naval world. The *Terrible* was only launched in 1895, but her design has for long been out-of-date, and the sister ship *Powerful* has been reduced to a hulk for use as a training ship at Devonport for two years or more. The *Terrible* and *Powerful* were remarkable vessels in their day, but were not among the conspicuous successes, from a naval officer's point of view, of the many designs of the late Sir William White. The departure of the *Terrible* leaves three battleships in the Third Fleet at this port, the *Albion*, *Goliath* and *Ocean*. We shall probably have to wait until another congestion of the basins at Chatham and the other ports occurs before any more vessels are sent here. At any rate, the Admiralty seem to be guided by necessity rather than choice, and remembering the nature of Milford Haven as an anchorage for big ships this is not surprising. The shipbuilding work of the yard continues at a satisfactory rate. The light cruiser *Cordelia*, launched in February, has been undocked to receive her engines, which are being provided by Messrs. Hawthorn, Leslie & Co. Some results of tests of propellers in an earlier ship of this kind are to be incorporated in the propellers of the *Cordelia*, which have been delayed somewhat in consequence, but not sufficiently, of course, to retard the ship's progress of building. There is evidently a keenness on the part of the authorities to leave no stone unturned to enable the *Cordelia* and her class to achieve a good reputation for speed. The *Trefoil*, oil-carrier, is now ready for her engines as soon as they are delivered, and by all accounts she should be one of the first, if not the first, of the new squadron of oil carriers to be ready for service. The *Trefoil* is being engined by Messrs. Vickers, who are themselves building the largest oil-carrier of the group, the *Olympia*. The engineers for the *Turmoil*, the other oiler at this yard, have made such progress that the early launch of the vessel is being spoken of to enable them to complete their contract. The *Turmoil* was laid down on November 3rd last, and will be propelled by Diesel engines, Messrs. J. S. White & Co., of Cowes, being the builders. The destroyer *Kale* has completed her refit and left, after a satisfactory trial, for the Nore, to resume duty in her flotilla. Dr. Macnamara, the Financial Secretary of the Admiralty, made an official visit to the yard in the first week of June, and in addition to receiving deputations of workmen made a very thorough inspection of the establishment. He was not impressed with the workmen's dining-room, remarking that the place was unfit for men to assemble to have their food in, and he also expressed surprise that the arrangements for men other than painters to wash their hands were so inadequate. It is hoped that these defects will now be put right, and that the plan for a new dining hall, drawn up some time since, will be put in hand, with convenient wash places adjoining.

MARINE MOTOR NOTES.

IN marine engineering circles much discussion has been under way during the past month as to the value of oil compared with coal for ship propulsion, and while recent trials of oil for fuel in steam boilers have resulted unfavourably to oil, it remains on evidence that the more economical means for using oil is to apply it to the engine direct; and this is the argument of the advocates of internal combustion engines, and on small vessels it is undoubtedly more economical and handier to fit oil motors. The large number of launches, river and ferry service boats which have been in use in various parts of the world and are now on order in increasing numbers show that they have given satisfaction and justified their adoption. They have been approved also for auxiliary purposes in yachts and sailing vessels of considerable size, and from the additions to the fleets of coasting traders, their success may be accepted, but for the ocean trader and passenger liner there is still a good deal of hesitancy. From the reports of launches and trial trips it is noted that many tank vessels for the carriage of oil have been built lately, and of these some are fitted for oil burning, some for coal burning and a few are propelled by oil engines. Among these latter, the *Arun* for the Flower Motor Ship Co., the *Hermes* for the Anglo-Saxon Petroleum Co., the *Artemus* for the Netherlands Co., and the *Elbruz* for a Belgian Co. There are now several outboard motors in the market for attaching to sailing or row boats, the number having increased during the past few months in competition to meet the enlarged demand. The annual report of the Fishery Board (Scotland) is very interesting reading, dealing as it does with an important department for the food supply; the service of the oil motor is becoming more fully recognised each year, evidenced by the number of boats fitted. The interest in the development of the oil industry in several directions recently and the formation of companies to open up new fields may be taken as indicative of the more general acceptance of the view that oil is the coming source of power; while it is also noteworthy to know of the investigations in progress, and the proposed more systematic and experimental research work, in order to discover the best and most economical method of producing oil from vegetable matter, with due regard to the excise. In the course of visiting around the coast, it is striking to see the motor doing duty in propelling vessels for pleasure and commerce in increasing numbers, and among these several constructed for abroad. Not the least interesting and valuable boats inspected were the motor lifeboats for the *Aquitania*, constructed by Messrs. Thornycroft. These are excellent additions to the life-saving appliances fitted on the new liner, which has now completed her maiden voyage; these boats can be used for the conveyance of passengers, for towing other boats of the ordinary type, and being fitted with wireless, the means of communication can be established when required. The work in hand by Messrs. Brooks is worthy of note and illustration.

THE United States Metallic Packing Co., Ltd., of Bradford, inform us that their London office has been removed to 116, Fenchurch Street, E.C., and the telephone number is Avenue 2710.

The Cunard Company's Liner "Aquitania."

Built and Engined by Messrs. John Brown & Co., Ltd., Clydebank. Launched 21st April, 1913. First sailing, Liverpool to New York, 30th May, 1914.

THE *Aquitania*, which completed early in June her maiden trip to New York, will, together with the *Lusitania* and *Mauretania*, maintain the Cunard Line express service between Liverpool and New York. These three magnificent vessels will be the fastest ships forming any express ocean service in the world. As is well known the *Lusitania*, also built by Messrs. John Brown & Co., Ltd., and the *Mauretania* hold all Atlantic speed records.

The maiden trip of the Cunard Company's latest leviathan has been a triumphal success. All those of her numerous passengers who have spoken on the subject seem to have been greatly impressed by the absence of vibration when she was steaming at full speed. The aged Lord Eversley, who went out by her, commented on the fact that in early days he had travelled by a remote predecessor, the *Niagara*. But either he, or the *Times* reporter, was a trifle at fault in recording his experience as having taken place in the year 1841, for the paddle steamer *Niagara* was not launched till six years later, and she did not start on her first voyage till the 20th May, 1848. The details of the *Aquitania's* round voyage should be placed on record. She left Liverpool at 2-30 p.m. on the 30th May, and her run to noon on Sunday was 475 miles; to 1st June, 576 miles; to 2nd June, 602 miles; to 3rd June, 527 miles—this day's run was spoiled by fog; to 4th June, 602 miles again; and to 5-9 a.m. on the 5th June, when she reached Ambrose Channel lightship, 399 miles; making a total distance of 3181 miles in five days, seventeen hours and forty-five minutes. This makes her average speed 23·1 knots. Returning her time was five days, eleven hours and fifty-eight minutes, the distance steamed being 3095 miles. This shows an average 23¾ knots. She reached Fishguard at 5-30 a.m. on the 16th June, her daily runs having been:—To noon on the 11th June, 541 miles; to the 12th June, 550 miles; to the 13th June, 544 miles; to the 14th June, 535 miles; to the 15th June, 541 miles; and to Strumble Head on the early morning of the 16th June, 384 miles. She brought home the biggest passenger list which ever left the port of New York—2649 persons, of whom 675 were first-class. Of these, 416 disembarked at Fishguard; as did 130 second-class out of a total in that cabin of 491. There were 1483 third-class carried, but of these all but 88 went on with the ship to Liverpool. Besides the passengers the big ship brought some 1546 bags of mails. She left Liverpool on June 20th, for her second voyage to New York.

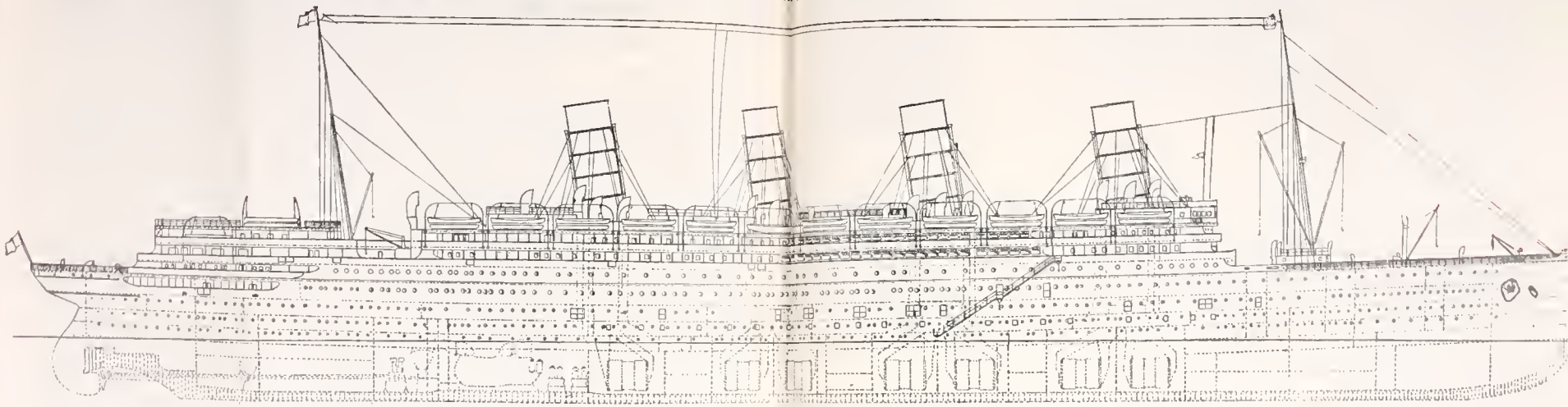
Considerable information regarding the *Aquitania* has been given from time to time in the pages of this journal, but before proceeding with a detailed description of the vessel, we will set out in the accompanying table the leading particulars of the larger Atlantic liners. Commencing with the *Lusitania*, it will be noted that the *Aquitania* is the largest British-built vessel at present in service, as the *Britannic* will not be ready until 1915. In addition to the *Imperator* and *Vaterland*, owned by the Hamburg American Company, it should be mentioned here that a larger vessel than either of the two named above was launched for the same Company on the 20th of last month, from the yard of Messrs. Blohm & Voss, Hamburg. This vessel will be placed in commission in May, 1915, and is of the following approximate dimensions: length, over all, 970 feet; beam, 101 feet; gross tons, 63,000. Her keel was laid down in April, 1913. She has been named *Bismarck*.

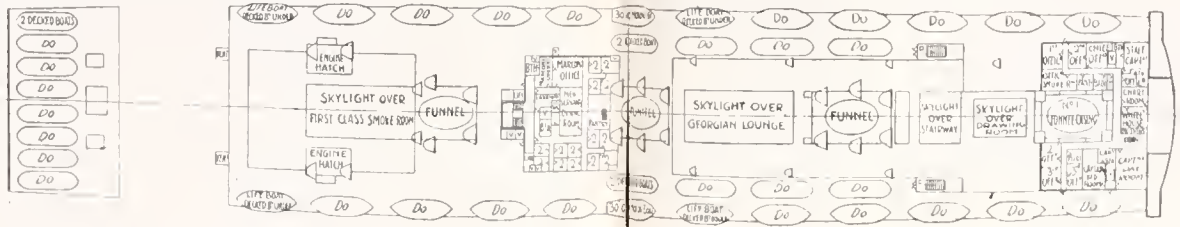
The quotation of mere figures, as detailed above, does not convey an adequate idea of the gigantic size and enormous dimensions of these "monarchs of the deep." In the *Aquitania* it is well on to half-a-mile's walk round the ship from bow to stern and back, and the deck space is equal to that of no fewer than eight football fields. As to the breadth, there is space enough for a broad highway with room for tramways,

Vessel.	Accommodation	1st voyage.	Length 'tween p.p.	Length overall.	Beam.	Displacement in tons.	Gross tonn'ge.	Speed in knots.	Horse power.	Machinery.
Lusitania ..	Pass. 2150 Crew 850	Sept., 1907	762·2	785	87·8	41,440	31,550	26	72,500	Quad. screws, turbines.
Mauretania ..	Pass. 2150 Crew 850	Nov., 1907	762·2	790	88	41,500	31,938	26	72,500	Quad. screws, turbines.
Olympic ..	Pass. 2400 Crew 860	June, 1911	852·5	883	92·5	52,000	46,359	21	46,000	Triple screws (turbine and reciprocating engines).
Imperator ..	Pass. 4100 Crew 1180	June, 1913	883·6	910	98·4	57,000	52,177	22·5	62,000	Quad. screws, turbines
Vaterland ..	Pass. 4100 Crew 1250	May, 1914	927 6	950	100·0	65,000	58,000	22·5	65,000	Quad. screws, turbines.
Aquitania ..	Pass. **3250** Crew **972**	**May, 1914**	**863**	**901**	**97·0**	**53,000**	**46,500**	**23**	**55,000**	**Quad. screws, turbines.**
Britannic ..	Pass. over 2500 Crew 950	not completed	870	903	94·0	54,000	50,000	21	50,000	Triple screws (turbine and reciprocating engines).
Bismarck ..	—	do.	approx. dimens.	970	101	—	63,000	—	—	Quad. screws, turbines.

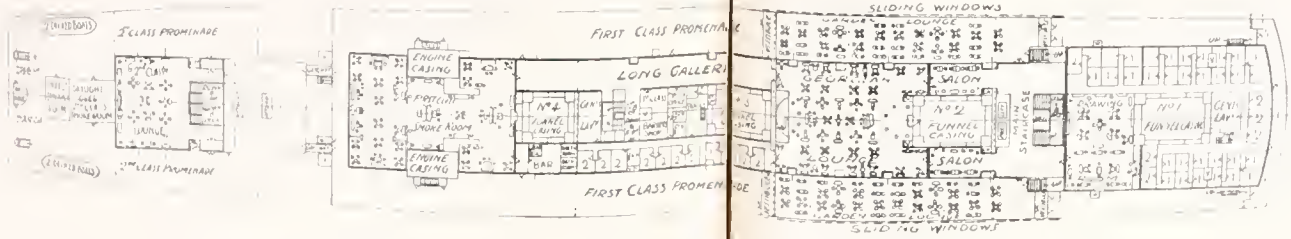
R.M.S. "AQUITANIA," built for the CUNARD LINE by Messrs. JOHN BROWN & CO., LTD.

DIMENSIONS:—Length between p.p., 865 ft.; Beam, 97 ft.; Gr. Tonn. 46,150; H.P., 55,000; Speed, 23 knots; Turbine-driven, Quad. Screws.

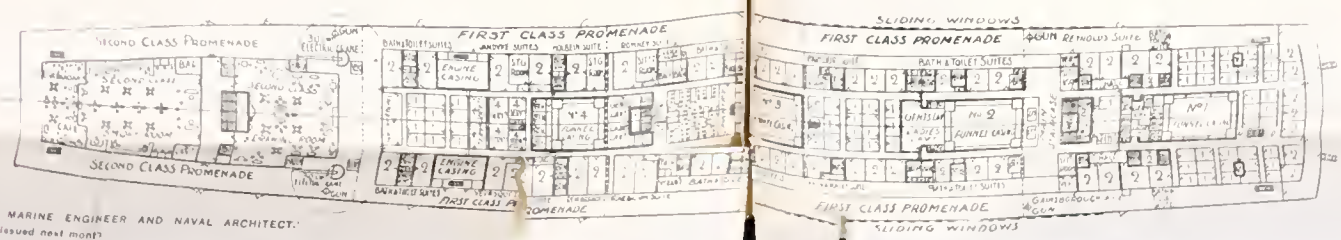




BOAT DECK



"A" DECK
(PROMENADE D^K)



"B" DECK
(BRIDGE DECK)

SUPPLEMENT TO "THE MARINE ENGINEER AND NAVAL ARCHITECT."
Further Deck Plans will be issued next month

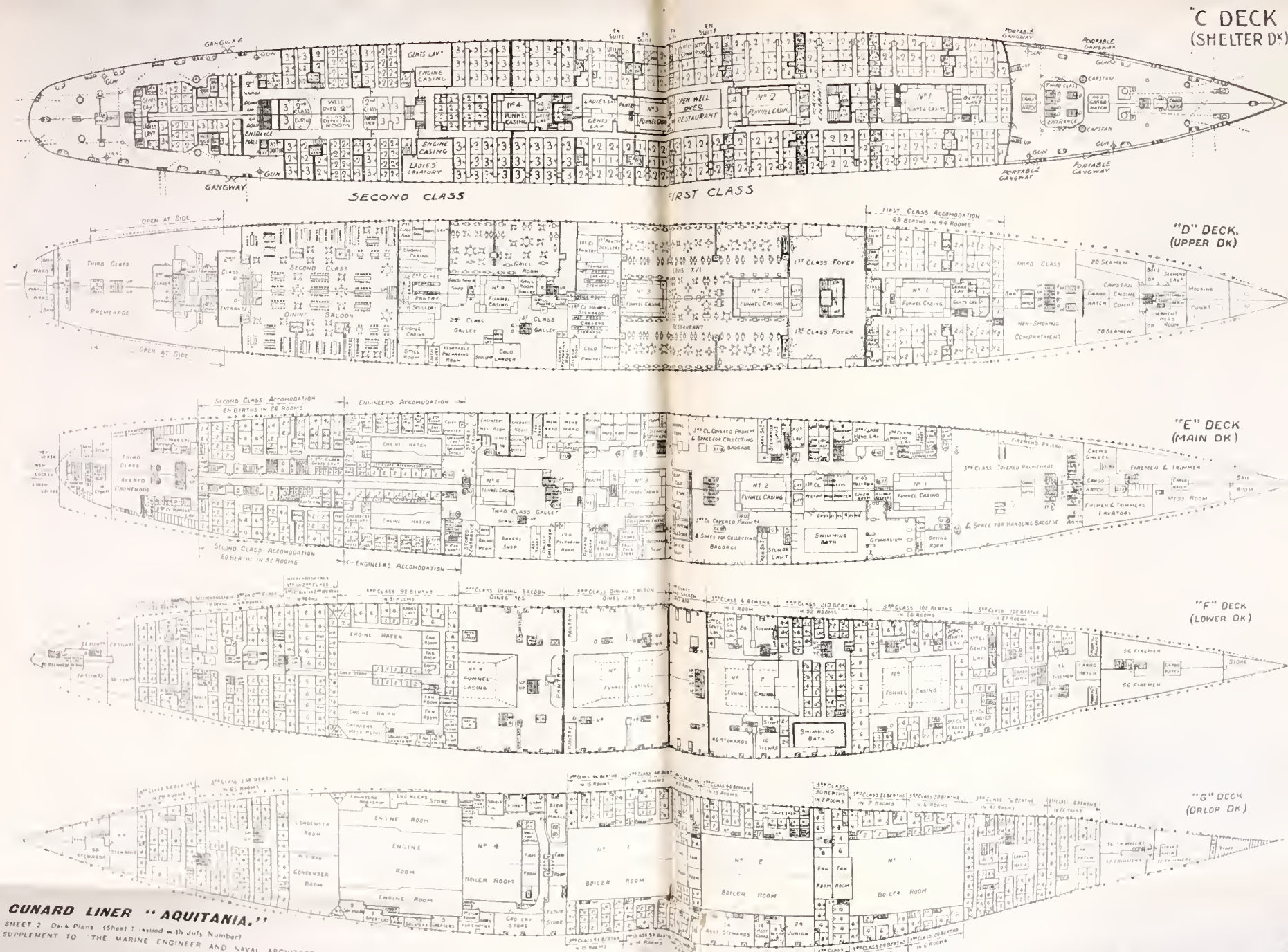
The Cunard

**Built and Engined by Messrs
First s**

THE *Aquitania*, which completed
maiden trip to New York, wil
Lusitania and *Mauretania*, ma
Line express service between Li
York. These three magnificent
fastest ships forming any express c
world. As is well known the *Lusi*
Messrs. John Brown & Co., Ltd., a
hold all Atlantic speed records.

The maiden trip of the Cunard
leviathan has been a triumph
those of her numerous passe
spoken on the subject seem to
impressed by the absence of vibra
steaming at full speed. The age
who went out by her, commented
early days he had travelled by a r
the *Niagara*. But either he, or t
was a trifle at fault in recording
having taken place in the year 1
steamer *Niagara* was not launched
and she did not start on her first v
May, 1848. The details of the
voyage should be placed on record
pool at 2-30 p.m. on the 30th M
noon on Sunday was 475 miles;
miles; to 2nd June, 602 miles; to 3r
this day's run was spoiled by fog;
miles again; and to 5-9 a.m. on t
she reached Ambrose Channel lig
making a total distance of 3181 r
seventeen hours and forty-five min
her average speed 23·1 knots. R
was five days, eleven hours and f
the distance steamed being 3095 n
an average 23¾ knots. She reac
5-30 a.m. on the 16th June, her
been:—To noon on the 11th June,
12th June, 550 miles; to the 13th J

Vessel.	Accommodation	1st voyage.	Len twee
Lusitania ..	Pass. 2150 Crew 850	Sept., 1907	76
Mauretania ..	Pass. 2150 Crew 850	Nov., 1907	76
Olympic ..	Pass. 2400 Crew 860	June, 1911	85
Imperator ..	Pass. 4100 Crew 1180	June, 1913	88
Vaterland ..	Pass. 4100 Crew 1250	May, 1914	92
Aquitania ..	Pass. **3250** Crew **972**	**May, 1914**	**86**
Britannic ..	Pass. over 2500 Crew 950	not completed	87
Bismarck ..	—	do.	appr dim



CUNARD LINER "AQUITANIA."

SHEET 2 Deck Plans (Sheet 1 issued with July Number)
SUPPLEMENT TO "THE MARINE ENGINEER AND NAVAL ARCHITECT."

The Cunard

**Built and Engined by Messrs
First s**

THE *Aquitania*, which complete
maiden trip to New York, wi
Lusitania and *Mauretania*, ma
Line express service between L
York. These three magnificent
fastest ships forming any express
world. As is well known the *Lusi*
Messrs. John Brown & Co., Ltd.,
hold all Atlantic speed records.

The maiden trip of the Cunard
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spoken on the subject seem to
impressed by the absence of vibra
steaming at full speed. The ag
who went out by her, commented
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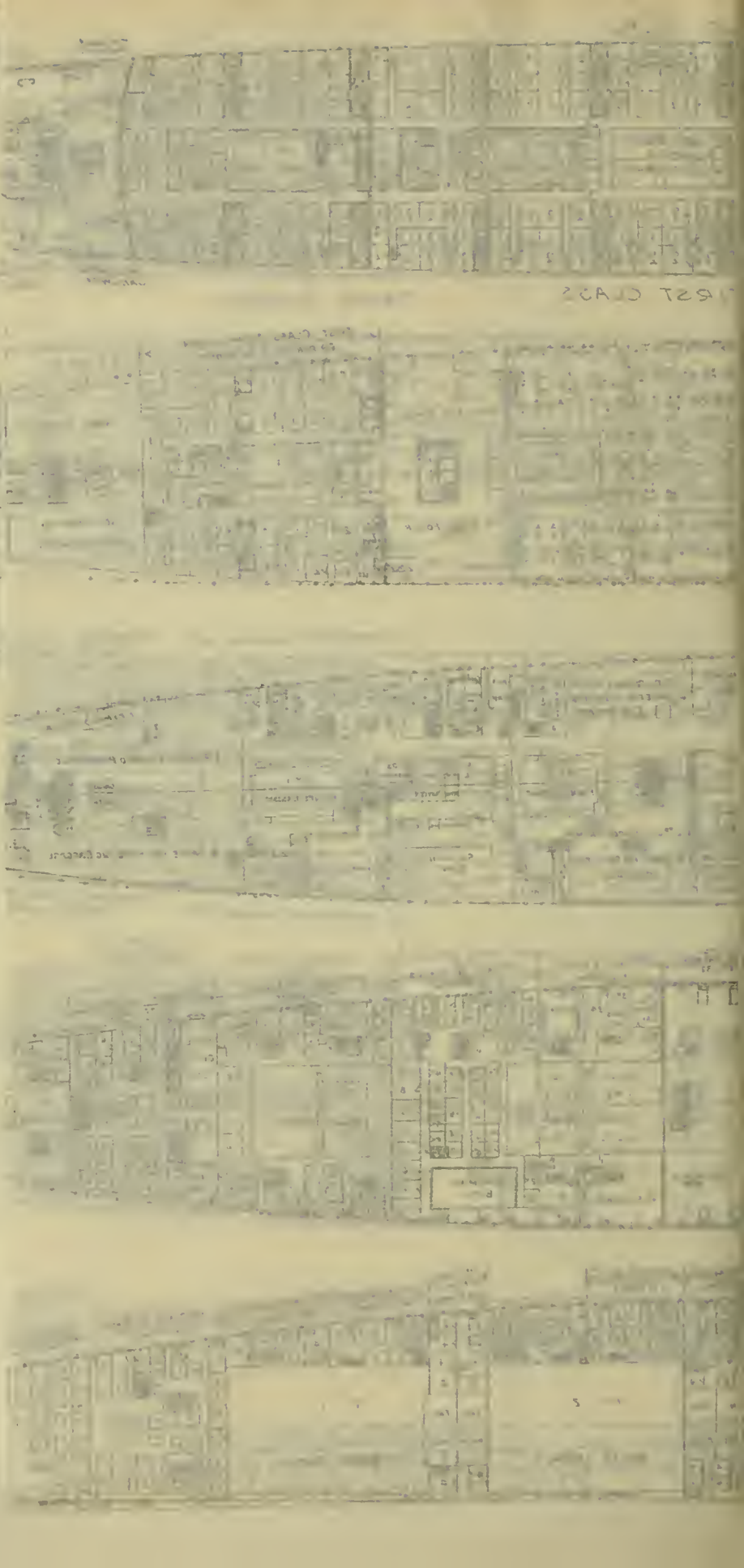
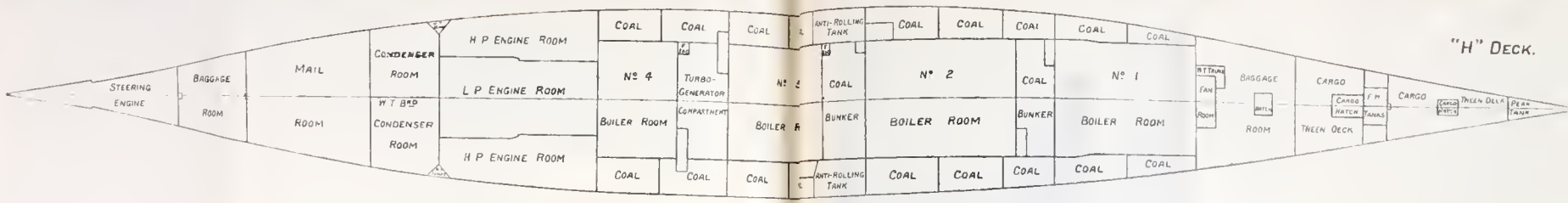


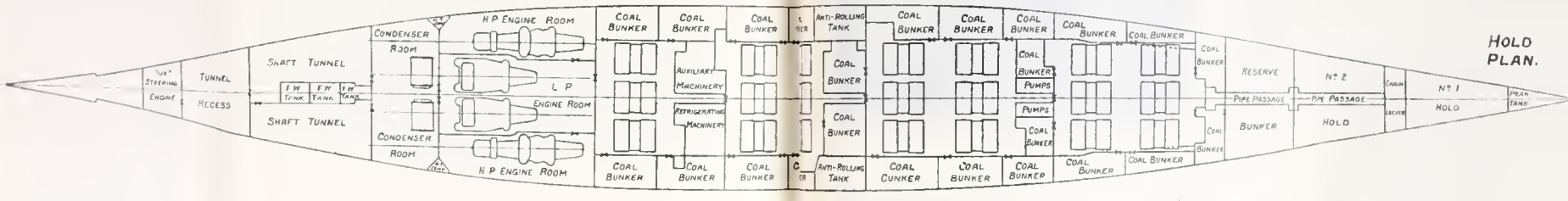
CUNARD LINER "AQUITANIA."

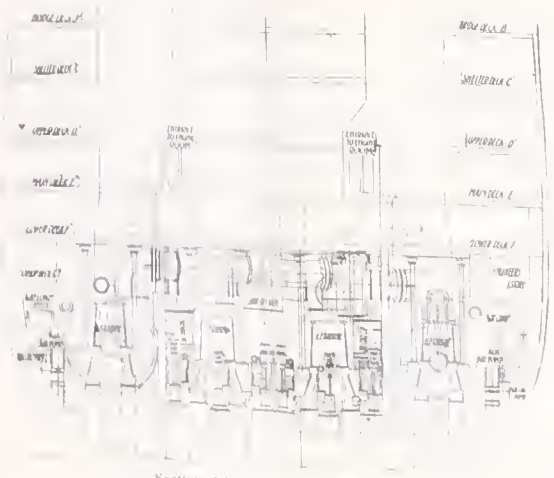
SHEET 3. PLANS AND SECTIONS OF GENERAL ARRANGEMENT OF MACHINERY IN CONDENSER AND ENGINE ROOMS

SHEET 1 ISSUED WITH JULY NUMBER.

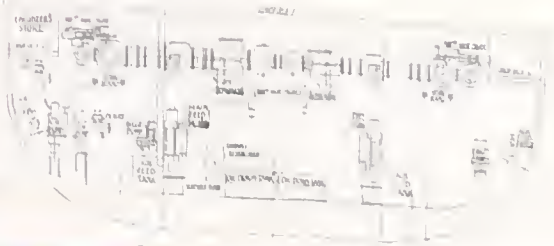
SUPPLEMENT TO "THE MARINE ENGINEER AND NAVAL ARCHITECT."



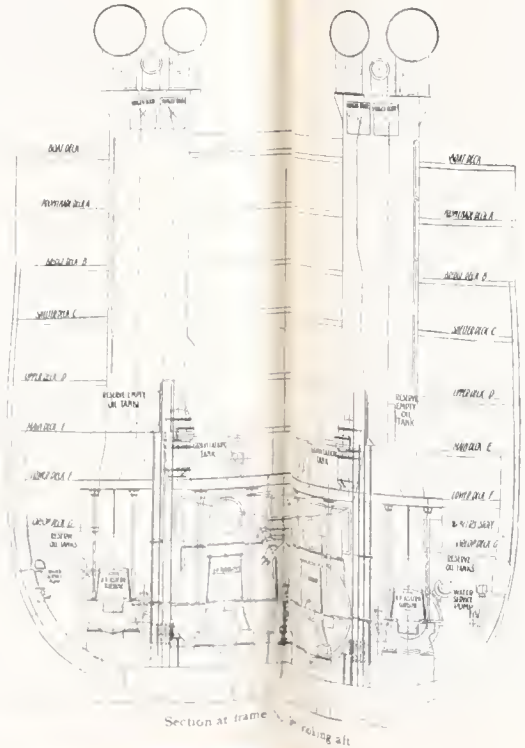




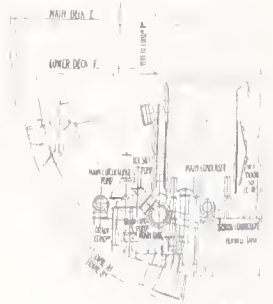
Section at frame No 109 looking aft.



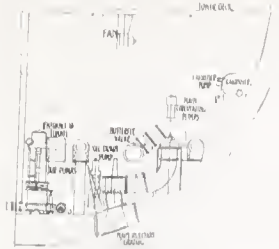
Section at frame No 110 looking forward



Section at frame No 92 looking aft

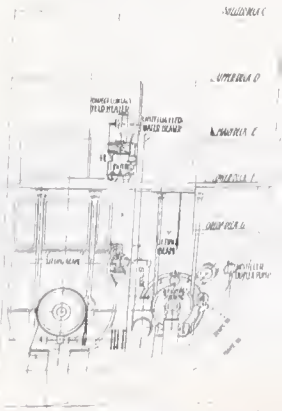


Half section at frame No 78, looking forward Condenser Room



Half-section at frame No 76, looking aft

Half-section at frame No 85, looking aft



Half-section at frame No 93, looking forward

The Cunard

**Built and Engined by Mess
First**

THE *Aquitania*, which complet
maiden trip to New York, w
Lusitania and *Mauretania*, n
Line express service between l
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having taken place in the year
steamer *Niagara* was not launchec
and she did not start on her first
May, 1848. The details of th
voyage should be placed on recor
pool at 2-30 p.m. on the 30th M
noon on Sunday was 475 miles
miles; to 2nd June, 602 miles; to 3
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making a total distance of 3181
seventeen hours and forty-five mi
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5-30 a.m. on the 16th June, her
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12th June, 550 miles; to the 13th

Vessel.	Accommo-dation	1st voyage.	L 'twe
Lusitania ..	Pass. 2150 Crew 850	Sept., 1907	7
Mauretania ..	Pass. 2150 Crew 850	Nov., 1907	7
Olympic ..	Pass. 2400 Crew 860	June, 1911	8
Imperator ..	Pass 4100 Crew 1180	June, 1913	8
Vaterland ..	Pass 4100 Crew 1250	May, 1914	9
Aquitania ..	Pass. **3250** Crew **972**	**May, 1914**	**8**
Britannic ..	Pass. over 2500 Crew 950	not completed	8
Bismarck ..	—	do	ap din

View from Upper Navigation Deck, looking aft.

use of third-class passengers. One large compartment is given over for the handling of mails and of passengers' luggage during the voyage. Gangway doors through the shell plating of the ship on each side give entrance to this deck. There are smaller doors affording entrance to each boiler-room. Isolated on this deck are hospitals, and third-class kitchens. On "F" deck there are large dining-saloons for the accommodation of the third-class passengers, the kitchen being on the deck above. The next deck, "G," is reserved entirely for third-class passengers. The seamen, firemen and trimmers are accommodated at the extreme bow of the ship on several decks, while the stewards have their sleeping-quarters at the extreme after ends of the various levels. Under "G" deck, forward and aft of the machinery space, is a hold or partial deck for cargo, baggage and mails, while at the extreme after end of the ship is steering-gear immediately in contact with the rudder-head.

NAVIGATION.—The bridge and officers' quarters are adjacent. Each officer has a room to himself, besides which there is a large smoking-room and the usual bath-rooms, oilskin lockers and other accommodation. The chart room is in close proximity to the bridge, and is fitted with every aid to navigation and the ship's safety that human ingenuity can provide. Amongst other instruments which are here installed may be mentioned the "Ralston Metacentric Board," by which the stability of the vessel can be computed and checked at any instant of the voyage, and her centre of gravity so arranged as to give the greatest possible safety, and at the same time, comfort to her seaworthiness. On the bridge itself everything is completely up to date, and here are fitted every appliance which can in any way assist or facilitate duties of the captain and officers in the safe navigation of the vessel.

Loud-speaking telephones, similar to those in use in the Navy, admit of instant verbal communication with the engine rooms, crow's nest, stem head, after docking bridge, steering engine flat, after wheel house and other parts of the vessel. There is telephonic communication between the bridge and all the principal offices of the ship, also to the Marconi house, in which there will be an operator on watch constantly day and night. The engine room telegraphs are of naval pattern, and are of the positive gear dead-beat type. There are also engine movement indicators, revolution indicators, and various docking and anchoring telegraphs.

As in all the Cunard Company's passenger vessels, the *Aquitania* is fitted with the submarine signal apparatus—the receiving instruments of which are installed in a special sound-proof cabin situated in the bridge house. All the navigation lights are doubly wired and are fitted with alarm indicators, which automatically give warning of any fault and switch on to the auxiliary set.

With regard to fire appliances—electric fire alarms communicate from various places direct with the bridge. All the cargo holds, mail rooms, baggage rooms, and other parts of the ship are connected with the bridge by a combined system of indicator and extinguisher. The ship is wired for searchlights, and besides being fitted with a long-distance wireless installation, is also fitted with lamps for Morse signalling.

The main steering gear is arranged well below the water line, and there is in addition a powerful auxiliary gear fitted on a flat below this, and connected to it. Both are worked by the latest system of hydraulic transmission, known as the telemotor, which may be operated from three different stations; the navigating bridge forward, the navigating bridge aft and the steering gear compartment itself. The ship is equipped with five of the latest pattern Kelvin, Bottomley & Baird compasses, the cards of which are of a new design specially prepared for the *Aquitania*. There are two latest type electrically-driven sounding machines for taking deep sea soundings whilst proceeding at full speed.

It scarcely need be said that the machinery necessary for warping the vessel in dock must be very powerful, and for this purpose there are four large steam capstans forward and four aft, all actuated by engines situated on the deck immediately below them. Two large windlass heads are located forward for heaving in the 11-ton anchors by means of cable $3\frac{7}{8}$-in. in diameter. There are besides the anchor windlasses, two windlass heads on deck for mooring cable. Cable holder brakes are able to hold a load of 250 tons when riding at anchor. All four capstans used simultaneously would give a hauling power of 1,050 horses. On the foremast are two huge derricks over 70 ft. in length, to facilitate the loading and discharging of cargo and baggage.

The Garden Lounge.

LIFEBOATS AND MOTOR BOATS.—The ship has twenty-eight pairs of davits, consisting of both the swan neck type and the Welin type, whilst amongst her boats are two motor life-boats fitted with wireless telegraphy. In addition to, and quite independent of the lifeboat equipment there are two large motor boats fitted with wireless telegraphy. These motor boats, constructed by Thornycroft, are carried on the boat deck, one on the port side and the other on the starboard side. Each boat is 30 feet in length by 9 feet 6 inches in breadth. The motor boat equipment was described and illustrated in the June number of THE MARINE ENGINEER AND NAVAL ARCHITECT. There will be eighty large life-boats stowed on the *Aquitania* decks. Ample accommodation is provided in the boats for all people on board the ship. The latest and most up-to-date appliances for placing them in the water have been adopted.

ENGINE AND BOILER ROOMS AND AUXILIARY MACHINERY.—It is difficult to convey an adequate idea of the immensity of the machinery, but some impression of this will, perhaps, be best gained by consideration of the general lay-out and space occupied as a whole. The greater part of the vessel's length is taken up with propelling machinery, engines, boilers and auxiliary machinery, and this for the full breadth throughout if we include the side bunkers. It should also be borne in mind that the height, from platform level to the top of the engine room skylight, is 92 feet.

BOILER ROOMS.—Starting at the forward end of the ship we have No. 1 boiler room containing six boilers, No. 2 boiler room containing six boilers, No. 3 boiler room containing six boilers, and No. 4 boiler room containing three boilers. Each of these boiler rooms is a water-tight compartment within a water-tight compartment. The fore-and-aft sides of the boiler rooms are formed by water-tight steel bulkheads, which are some eighteen feet from the outer skin of the ship, and transverse steel bulkheads fitted with water-tight doors, separate adjacent boiler rooms. We thus get water-tight compartments on both sides of the ship outside the boiler rooms, whose floor levels, usually termed the "inner bottom," are also water-tight, extending right across the ship, and situated several feet above the bottom of the ship. In these compartments coal is carried. Access from these to the boiler rooms is gained by water-tight doors, fitted in the sides of the boiler rooms, and through these coal is conveyed to the boiler fires. The transverse sides of the boiler rooms are formed of steel bulkheads and are also water-tight, with water-tight doors for communication purposes between various boiler rooms and the engine rooms. In the event of the outer sides being pierced, it is clear that flooding could only take place in the outer compartments or coal bunkers, formed by the skin of the ship, and the longitudinal bulkhead forming one side of any boiler room, the water-tight doors in this bulkhead preventing water from flooding into the boiler rooms. Similarly, if the bottom be pierced, water could only flood into the compartments formed by the bottom of the ship and the inner bottom, or water-tight floor of the boiler rooms and the bunkers. So long as the floor remains intact, water could not flood the boiler rooms above. Further, the space between the aforesaid inner bottom and the bottom

Weir Uniflux Condenser alongside the *Aquitania*

of the ship, is itself divided into water-tight compartments by longitudinal steel divisions, so that if the bottom be pierced the space filled with water is thus limited in extent. For such an event as flooding, consequent on collision, pumping arrangements have been provided for dealing with about 15,000 tons of water per hour. Water ballast is carried in the cellular double bottom formed between inner and outer shells, and this space further provides large stowage capacity for the carriage of fresh and condensed water.

BOILERS.—We can now take the various units in detail, commencing with the generating of steam in the boilers. There are twenty-one large double-ended boilers, each with eight furnaces, the combined area of fire grate being 3,542 square feet, while the most efficient parts of the internal surface, in contact with water outside and exposed to flame and hot gases inside, give an aggregate of 138,596 square feet, capable of converting 9,600 tons of water into steam per day.

FORCED DRAUGHT FANS.—The boilers are constructed for a working pressure of 195 lbs. per square inch, and all work under forced draught. The air pressure is maintained by twenty-eight fans 66 inches diameter, driven by fourteen electric motors each 50 horse-power, one motor driving each pair of fans, which are arranged in separate fan rooms immediately above the boilers. The fans are connected to the boiler fronts by trunking, through which is discharged the air drawn in from the boiler rooms. The air is heated by coming in contact with tubes, which in turn are heated by the waste gases, and is afterwards blown into the furnaces and through the burning coal. Thus the air which passes down the huge ventilators on the top deck first cools the firemen in the boiler rooms, ventilates the latter, and is finally drawn in by the forced-draught fans and utilised as described above for increasing the rate of combustion in the furnaces. Each of the three forward groups of six boilers, with their corresponding uptakes and funnels, weighs 1,600 tons. There are four elliptical funnels, 24 ft. by 17 ft., and the distance from the top of the funnels to the

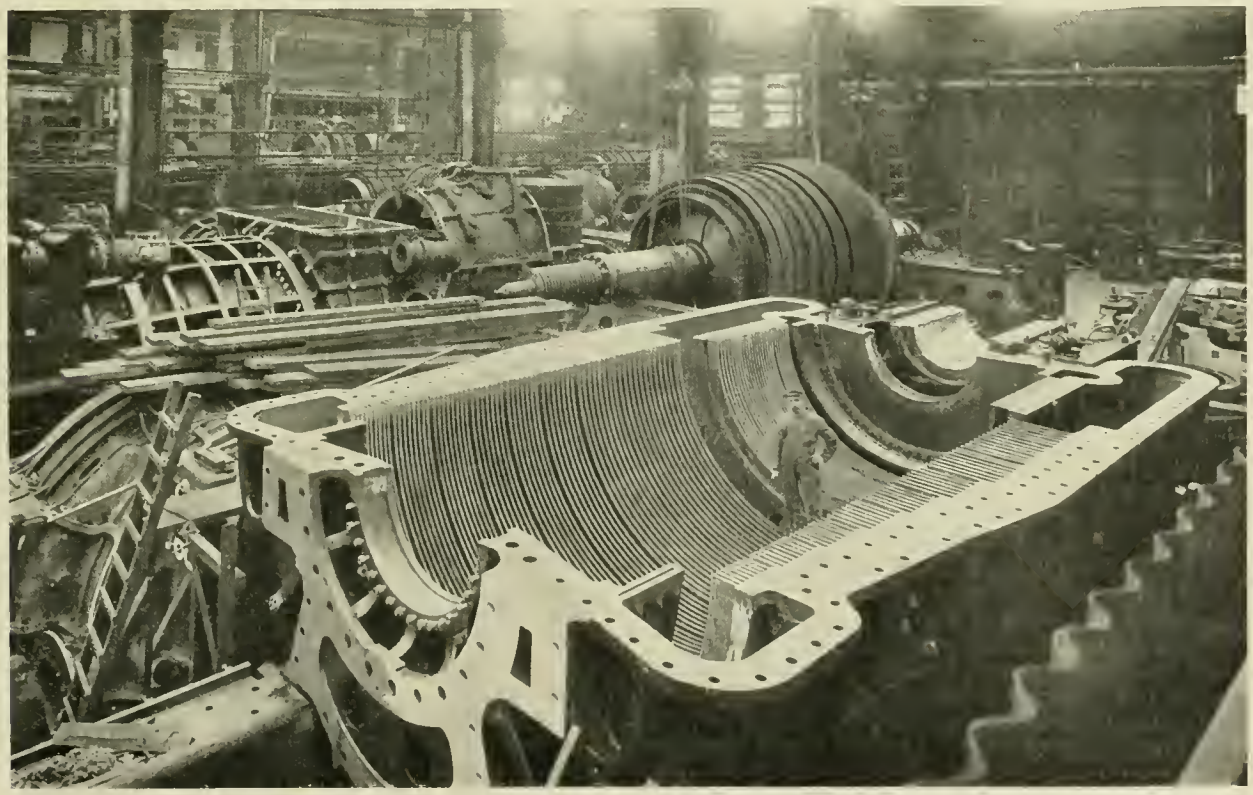
level of the fire grate in the boiler room is some 160 feet. Great care has been exercised in the design of the boiler room firing-platform to ensure that coal, ashes and dirt do not find their way to the innumerable pipes carried underneath, and the highest efficiency is thus assured, in the case of flooding, for the pumping arrangements, in providing complete immunity from choking of pipes.

ASH EXPELLERS.—For disposing of ashes in the boiler rooms there are seven of the latest ash-expelling devices, *viz.*, Stone's patent hydraulic underline ash expeller, whose pumps are driven by steam turbines. The ashes are shovelled into a hopper, through gratings which regulate their size, and after being drawn into the expeller, are discharged through the ship's side far below the water line. These machines are fitted in large recesses in each boiler room, which serve for the stowage of ashes after cleaning fires, thus facilitating the work of the stokers by preserving a clear platform at all times. They may also be used as bilge pumps, or for discharging water overboard in case of emergency, and when it is mentioned that the capacity of the pumps in these seven expellers is approximately 4,500 tons per hour, it will at once be seen that the service they are capable of rendering at such times may be of the utmost value. In addition eight ash hoists are distributed through the boiler rooms. The plant will be called upon to dispose of about 1,200 tons of ashes during the round voyage.

ENGINE ROOMS.—On leaving No. 4 boiler room we pass through a water-tight door and enter the centre engine room, in which the low-pressure ahead and astern turbines are situated; the high and intermediate-pressure ahead and astern turbines being located in the port and starboard wing engine rooms respectively. In all there are three engine rooms, one on each side of the centre room, to which access is obtained by means of water-tight doors in the longitudinal water-tight bulkheads. All three compartments are water-tight, as in the case of the boiler rooms and bunkers.

TURBINES.—The turbines are directly coupled through four lines of shafting to the screws, this arrangement permitting a reasonable sub-division of the immense power, and they are arranged as already described in three engine rooms. An important departure from the Cunard Company's previous practice has been made in this scheme. The triple compound system has been adopted for the turbines. In giving a greater range of expansion for the steam, this enables high economy to be maintained at normal speed, and, by special adaptation of steam distribution, provides for the full use of reserve power necessary during a call for speed. By following the course of the steam this system may be readily appreciated. Thus, entering from the boiler rooms the steam first rotates the high-pressure turbine in the port engine room; after expending work in passing through the blading, it is exhausted into the intermediate-pressure turbine in the starboard engine room, the steam flowing then to a pipe, large enough for a man to walk through, leading to both low-pressure turbines, mounted on the inner shafts and housed in the centre engine room.

CONDENSERS.—The low-pressure turbines then exhaust to the condensers, where the steam comes in contact with some 18,700 tubes, having a cooling



View of Turbine parts in Messrs John Brown & Co.'s Clydebank Works.

surface of 46,000 square feet, through which the enormous quantity of 18,500 tons of sea water pass per hour, this being necessary for the condensation of the steam and the efficient working of the turbines. It may be interesting to note in passing that if the condenser tubes were placed end to end they would reach a distance of nearly fifty miles.

In addition to the condensing plant already described, the machinery spaces contain a tremendous amount of additional apparatus required to act in an auxiliary capacity for the main propelling machinery due to working conditions in port; for all purposes in connection with the safety of the ship as regards rapidity and efficiency, dealing with collision, damage or fire outbreak, and also for maintaining the various services for the comfort and convenience of the passengers. The steam pipe arrangement is such that in the event of any one turbine being disabled, the other three shafts can be worked, and since the turbine, as a machine, is eminently suitable for taking an overload, the fact of any single shaft being out of action would not appreciably reduce the speed of the ship.

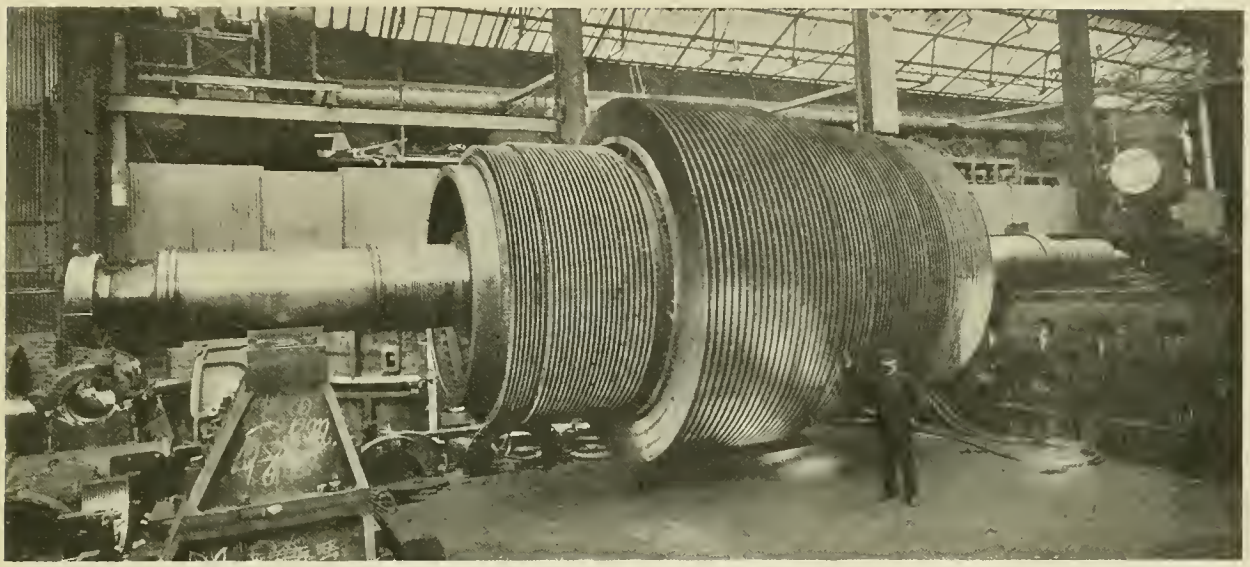
ASTERN TURBINES.—A special feature is the large power which is provided for going astern, there being a separate turbine on each of the four shafts for this purpose. Here again economical use of steam has been ensured by compound working. Thus the separate high-pressure astern turbines, situated one in each wing engine room, exhaust into their respective low-pressure turbines, these latter being incorporated in the same casing as the low-pressure ahead turbines in the centre engine room, one on each of the inner shafts. The total length of the engine space is 84 feet. A further idea of the engine dimensions may be had by consideration of the weights. The high-pressure ahead turbine is approximately 240 tons weight, the intermediate-pressure turbine 283 tons weight, while each of the low-pressure and astern turbines complete weighs 450 tons. The high-pressure astern turbine weighs 120 tons. All the main turbines are of the Parsons reaction type, the steam passing alternately through rings of fixed and moving blades. The moving blades are attached to the exterior of a drum and are interspaced between the rings of fixed blades, which are attached to the inside of a casing enclosing the drum. To this drum or rotor is coupled a line of shafting and propeller, which transmit the power for driving the vessel. The total blades or vanes in the turbines amount to over one million in number and range in height from 1½ in. to 20 in. The problems in design to which the blading gave rise have been carefully considered, and the system and method of securing the blades, finally evolved after many costly experiments, is representative of much thought and study combined with practical experience gained from the running of the *Lusitania*, *Mauretania* and *Carmania*.

VENTILATION OF ENGINE ROOMS.—Owing to the enormous size of the turbines, their manœuvring valves, steam pipes and connections, the surfaces for heat radiation are such that the ventilating scheme had to be on a scale unparalleled in previous liners, and is the result of calculation and thoroughly scientific and practical experiment. Open type and other fans have been installed, the whole being capable of handling the enormous volume of twenty million cubic feet of air per hour. The huge manœuvring and other steam valves are each operated by a combined steam and hydraulic reversing gear, which enables the engineer officer in charge to have full control of all engine rooms from the starting platform, by simply throwing over the necessary levers by hand.

STARTING PLATFORM.—The starting platform is perhaps the most interesting feature of the engine room to the non-technical visitor, representing, as it were, the heart of the ship from which emanates the control of all energy and motive power, for the upkeep of this floating city and for the health and comfort of all its inhabitants. It is situated at the forward end of the centre engine room, and is partly enclosed at the after side by a screen. There are over 120 indicators and gauges arranged here, together with a barometer, indicating the atmospheric pressure, a clinometer showing the trim of the ship, and clocks, which are electrically controlled—the whole show the engineer officer in charge not only what is going on in the three engine rooms, but also in the most distant parts of the ship. Here also are found indicators for recording the speed of each turbine, together with instruments which show the direction of rotation at any moment, thus enabling the engineer officer to be certain that each turbine is responding to the controlling levers operated by him. On the starting platform, on each side of the ship's centre line, are situated the hand levers controlling the manœuvring valves. These manœuvring valves are of very large dimensions and an idea of their size may be had from a consideration of their weight, which is in the vicinity of 25 tons each. Their operation requires the provision of a separate small steam engine for each valve, these being brought into action by the controlling levers. In case of emergency these valves can also be operated by hydraulic power from the starting platform.

CONTROL OF FIRING.—The firing of the four boiler rooms is controlled from the starting platform, electric gongs being sounded in each boiler room, thus indicating at regular intervals when coal is required in the furnaces. Each boiler has eight furnaces, and in conjunction with the electric gongs already mentioned, numbers appear automatically on dials, and the furnaces are fired in the rotation indicated.

CONTROL OF WATER-TIGHT DOORS.—Above the starting platform a model plan of the ship is outlined in polished metal, together with longitudinal and transverse lines representing the water-tight bulkheads throughout the entire length. Corresponding to the position of the water-tight doors in these bulkheads, are fitted small coloured electric lights, and by an ingenious electric contrivance these lamps immediately light when the doors in question are closed from the bridge, a similar indicator being also fitted there. The water-tight doors are shut from the bridge each day, and it is evident that should any door fail to act, the chief engineer is informed by the particular lamp representing the door failing to light. He can thus at once take steps to have it closed. The starting platform is in direct communication with the chief engineer's office, which is really a central bureau, being in direct communication with the bridge, steering gear engine room, electric light engine room, doctor, purser, chief steward and other officers. It is not, however, solely devoted to the propulsive control of the ship, but, in addition, most of the machinery and



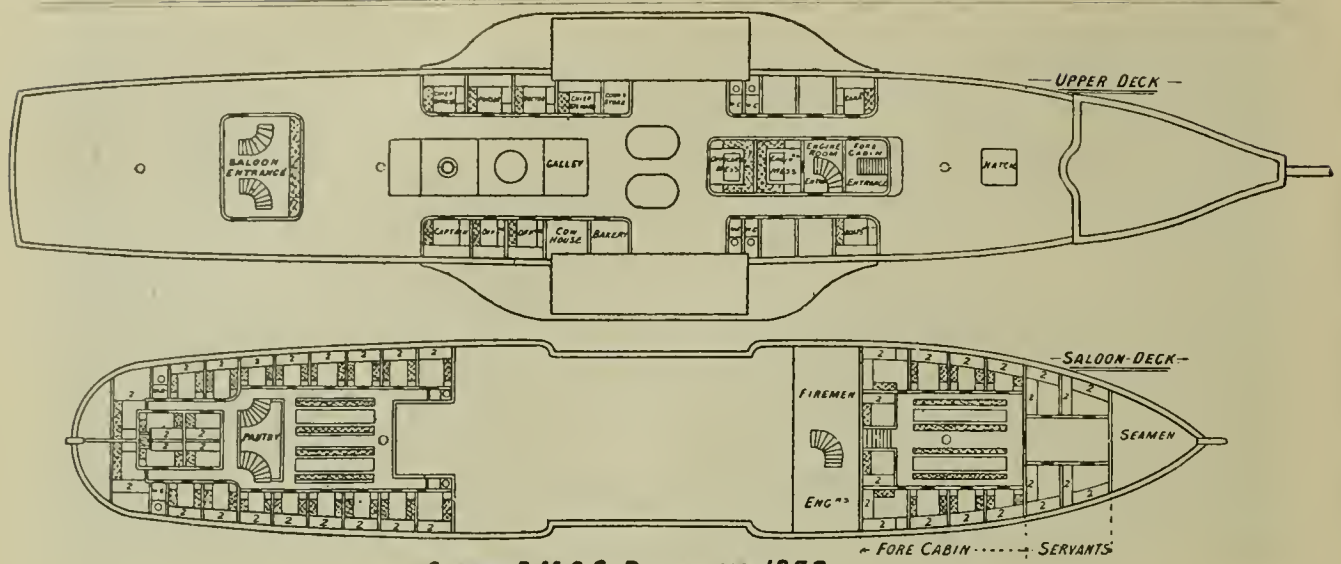
Rotor of a low-pressure ahead and astern turbine.

appliances required on board, solely for the convenience and comfort of the passengers, can be controlled from its vicinity.

EMERGENCY STAFF.—As the modern liner has grown, so also has the demand for machinery and appliances of all kinds, and this has added enormously to the responsibility of the chief engineer and his staff, which in the *Aquitania* number 34 engineer officers and 350 men. The duties of about 30 per cent. of the engineer officers are entirely confined to the care and operation of appliances, installed solely in connection with the passengers and their accommodation. For example, there is a ventilating engineer, who is responsible to the chief engineer for the air supply and temperature of all state-rooms, public rooms, saloons and passenger accommodation throughout the ship, speed of fans, opening of louvres and the amount of heat supplied and regulated according to climatic conditions. Charts are placed before the chief engineer showing the temperature throughout the vessel every hour of the day. The deck engineers are solely concerned with the supply of hot and cold salt water for the large swimming bath and morning baths, hot and cold fresh water in the state-rooms and lavatories, evaporation of sea water by a large plant carried aboard, capable of supplying 300 tons of pure fresh water per twenty-four hours, filtered and iced water for drinking and cooking, washing water for kitchens, pantries and scullcries, the provision of water for sanitary purposes, water for washing decks, and the regulation and supply of water for the fire service throughout the entire ship, also the hydraulic pumps for closing the water-tight doors. The engine room is the centre for the various services mentioned, and from there, in the vicinity of the starting platform, may be regulated the temperature and delivery of the services in question. They are responsible for a large-power oil engine and dynamo, "The Emergency Lighting Set," for use in port and in case of collision, and for the supply of energy for transmission of wireless messages, navigating and various other lights throughout the vessel; also petrol engines for the motor lifeboats, together with the dynamo for wireless installation which is carried. The temperature of ship's stores, which are carried in large compartments, have also to be regulated by powerful refrigerating machinery, capable of producing extreme cold, so that beef, mutton, game and poultry, bacon, fish, milk, fruit and vegetables, together with cold cupboards in the various pantries, and cabinets for cooling beer, wines and minerals, may each be maintained at the temperature found most suitable in each case.

GENERAL ELECTRICAL PLANT.—In addition to machinery in kitchens, noted elsewhere, electricity is used on the *Aquitania* for power purposes which the following will serve to illustrate, and careful examination is necessary during each voyage: Passenger lifts, mail and baggage hoists, store lifts, service lifts, massage vibrator, and other miscellaneous apparatus in the gymnasium, the sterilizer in the dispensary, the fan for the laundry continuous drying machine, and about 200 electric motors throughout the ship; also for 9,000 fixed lamps, clusters and portables for the ship's lighting, seventy side lanterns, Admiralty Morse lamps, masts, side lights and stern lamps, with indicators for same; twenty fire alarms, twenty-seven inter-communication telephones, eleven loud-speaking telephones for use in engine room, deck or bridge, or any place where noise has to be overcome; thirty-six electric clocks, 1,440 electric bell pushes, lifeboat lamps, the complete Marconi installation, the electric control of steam whistles, etc.; fans in cabins and crew's quarters, radiators for heating rooms, electric tell-tale on bridge from engine room, deck cranes for baggage, water-tight door indicator, submarine signalling apparatus, iceberg detecting apparatus, searchlight, heaving ship's lead, shore coaling winches, electric clocks synchronising with master clock, boot cleaning, knife cleaners, ice cream machine. The above may serve to give a general idea of the different electrical appliances which come under the care of the electrical engineer officers and require careful attention during each voyage.

Two engineer officers relieve each other, with six-hour watches throughout the whole voyage, in the steering gear engine room, wherein is situated the



CUNARD R.M.S.S. BRITANNIA, 1840.

Pioneer vessel of the Cunard fleet Length between p.p., 207 ft.; beam, 34 ft. 4 in.; depth, 24 ft. 4 in. Tonnage, 1154. I.H.P., 740. Average speed, 8·5 knots.

massive steering engine operating the ship's rudder, and their sole duty is to see that the machine works smoothly.

A thoroughly equipped engineering workshop, with tools operated by electric motors, is provided on board for the quick repair, by the engineering staff, of any unit which might go out of order.

REFRIGERATING MACHINERY. — The refrigerating machine is entirely in connection with the cuisine department, as no refrigerated cargo is carried. The machinery consists of a powerful compound duplex machine working on the carbonic anhydride system with two compressors, two independent evaporators, duplex pumps for circulating cold brine through the various chambers, and pump for circulating sea water through gas condensers. Briefly, the action of the machine is as follows:—A steam engine provides power for compressing the gas in the compressor; the temperature of the gas is thus raised, but the heat is dissipated immediately afterwards by the action of the cooling water circulated through the condenser, the gas being liquefied and its temperature considerably reduced as a consequence. It is then passed through the evaporator, where it extracts heat necessary for evaporation from the brine, cooling this latter to a very low temperature. A separate pump circulates this cold brine throughout the various chambers, the air in which is, of course, cooled by contact with the brine piping. On leaving the evaporator, the carbonic acid gas is drawn into the compressor, the cycle of operations being then continuously repeated.

The *Britannia*, Cunard Coy.'s Pioneer vessel. Her first voyage, 4th July, 1840, from the Mersey for America was accomplished in 14 days 8 hours.

WATER-TIGHT DOORS.—A vital safeguard is provided, in that the forty-five principal bulkhead doors are fitted with the Stone-Lloyd hydraulic system. The doors can be kept closed by the officer on the bridge for as long as he considers advisable, yet they can, when required, be opened locally by anyone desirous of passing through, but the doors close immediately the manual effort is withdrawn; they cannot be left open. Thus is fulfilled the recommendation of the International Conference on Safety of Life at Sea, that all water-tight doors shall be kept closed during navigation, except when necessarily opened for the working of the ship.

By means of an indicator the officer in charge can at any time see at a glance the position of any or all the water-tight doors—whether they are opened or closed. A feature of the installation fitted on the *Aquitania* is, that there are *two* control dials on the bridge instead of one. One control governs the doors in the longitudinal bulkheads, the other the doors in the transverse bulkheads. The object of this is to enable the commander to maintain the doors along the inner skin of the ship in the closed position, and yet to be able to temporarily place the doors in the transverse bulkheads in the open position to facilitate the passage of material for the efficient working of the vessel at such times as circumstances render necessary.

AUXILIARY MACHINERY.—The auxiliary condensing plant is in duplicate, one set being placed in each wing engine room, and consisting of condenser, air pump and circulating pump, and is reserved almost entirely

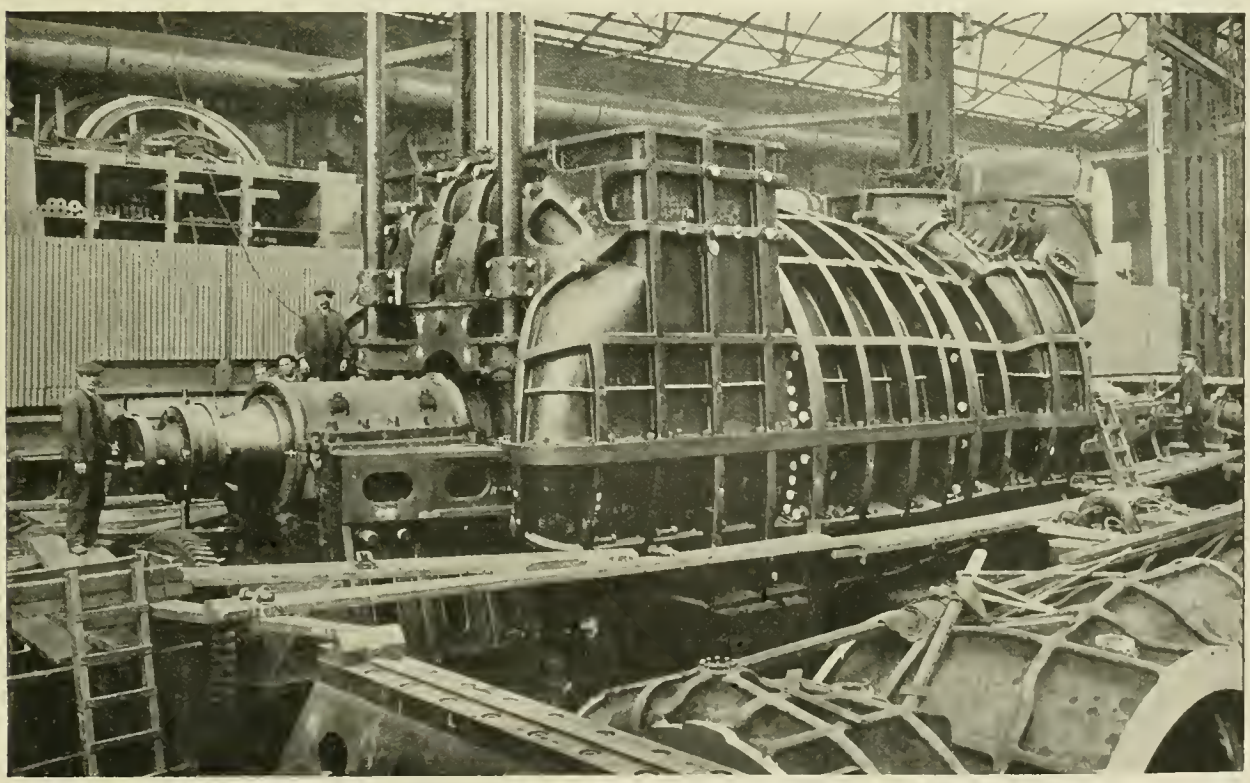
for condensing the exhaust steam from engine room and deck auxiliaries, while working in port. Suitable cross connections are fitted whereby this plant may be used to relieve the auxiliary exhaust system at sea. There are four water-service pumps (two in each wing engine room), one sanitary and one wash deck pump in the centre engine room. In the port wing engine room there is a motor-driven sanitary pump, a departure from ordinary practice, the results of which will be followed with interest. For operating the Stone-Lloyd doors, three pumps of strong construction are situated in the centre turbine room. There are four bilge pumps, one in each wing engine room, one in the main condenser room, and one in the pump recess fitted in the cross bunker between Nos. 1 and 2 boiler rooms. For supplying hot salt water to baths a pump is provided in the port condenser room. Two pumps for supplying drinking and cooking water, and washing water respectively are fitted in the port wing engine room, these pumps being connected with the water storage tanks in the ship's double bottom, and arranged to discharge to service tanks on deck, whence the supply to the various draw-off taps is led by gravitation.

CARGO WINCHES AND CRANES.—The cargo machinery consists of six cargo and warping winches of the silent type. For dealing with passengers' baggage, two 30-cwt. electric cranes are fitted, having a 21 ft. 6 in. radius, lifting from a depth of over 80 ft. at a speed of 120 ft. a minute to 300 ft. per minute.

VENTILATION OF PASSENGER ACCOMMODATION.—Each compartment of the vessel and the accommodation throughout has received separate consideration. For supplying warm air to cabins and alleyways thermo tanks are fitted. Electrically-driven fans draw in cold air which is warmed by contact with steam-heated tubes, and then discharged through trunking to different parts of the ship. By reversing the action of the fan, vitiated air may be exhausted in warm weather. In addition, and when steam heating is in use, fifty fans will supply cold air or exhaust foul air into the open. In all, the plant is capable of handling twelve million cubic feet per hour.

STEAM HEATING.—The system is arranged on the flow and return low-pressure principle of sufficient capacity to enable a temperature of 70° F. to be maintained in all rooms and corridors, in all conditions of weather experienced in North Atlantic, even when obtaining 18° of frost or 14° F. Safety and economy are ensured by the adoption of a steam pressure of 5 lbs. or under. It may be mentioned that all radiators are fitted with patent thermostatic valves, by means of which the temperature may be regulated to within 1° F Constant circulation is effected by means of a special pump, capable of maintaining 15 inches of vacuum, which is connected up to the return pipes.

HOT SALT WATER.—The hot salt or "Roman" type of bath is perhaps the most popular of all on board ship. This is evidenced by the very large demand made upon the system, and the installation specially reserved for this purpose is worthy of note. Water is first pumped to a storage head tank on the boat deck. Situated in the condenser room is a special storage pattern calorifier, taking cold salt water at the inlet from the head tank; steam heating tubes within the casing raise the temperature of the water to 160° F.,



View from aft end of a low-pressure turbine complete.

when an automatic device comes into action and cuts off the steam supply. A special pump is used for inducing primary circulation throughout the system.

COLD SALT WATER.—Supply pipes are led to various points throughout the ship for sanitary service, washing decks, baths and fire service. Two powerful duplex pumps and one motor-driven pump, situated in the main engine rooms are connected to ship's side valves and lift sea water up into tanks of large capacity on the boat deck, thus by gravitation ensuring a steady flow and plentiful supply in the supply mains. The total capacity of the plant is 520 tons per hour. A large size main completely encircles the main deck, from which rising mains and down-comers supply the remaining decks.

The fire service is particularly ample. It has been arranged that the above-mentioned pumps may discharge direct to the fire main, should occasion arise, without passing through the head tank. In addition, the ballast pumps are connected up suitably for doing fire duty in emergency, while there are five hand pumps, three of which are fixed on the shelter deck and two are of the portable type.

An important feature of the *Aquitania* is the salt water plunge bath equipment; the pumping arrangements permit of frequent or continuous changing of the water and the maintaining of better conditions than those which obtain in plunge baths ashore.

HOT CONDENSED WATER.—The hot washing water or "hot condensed" service performs a most extensive duty, branches from circulating mains being led to no fewer than 850 draw-off taps. These are situated in all lavatories throughout the vessel, and connect with basins in first-class private bathrooms and state-rooms, dispensary, operating room, barbers' shops, service lockers and sinks in kitchens, pantries and sculleries.

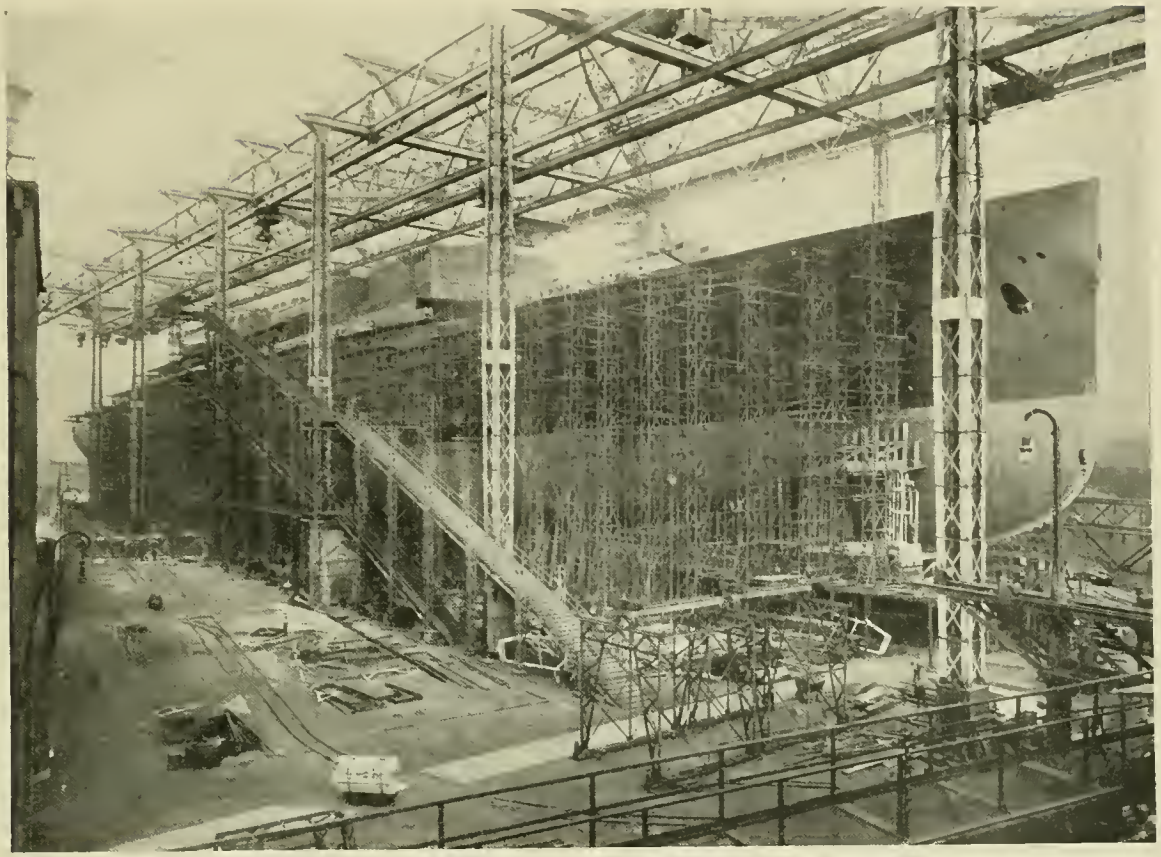
Two storage pattern steam-heated calorifiers, each of a storage capacity of 200 gallons, are fitted, and the working output is rated at 2,500 gallons per hour. Water is pumped from one of the double-bottom tanks to a head tank on deck, and thence by a down-comer is led into the calorifier, where its temperature is raised to 160° F. and automatically regulated. Primary circulating is induced by means of separate pumps, and the mains are so arranged that no tap is further distant than four feet from its supply main.

COLD CONDENSED WATER, or cold washing water, is led to wash-basins of first, second and third-class officers', engineers', crew's and hospital lavatories, to basins in first-class private bathrooms, to basins in first and second-class state-rooms, dispensary, operating room and barber's shop, to service lockers, sinks in galleys, pantries, sculleries and photographic dark-room. The condensed water pump draws water from certain of the double-bottom tanks, discharging to three separate head tanks on deck, whence gravitation supply is led to the various draw-off taps. The pump has a rated capacity of 50 tons per hour.

DRINKING WATER.—Special provision is being made in this service to ensure an ample supply of pure fresh water. In addition to the ordinary filtering devices for the arresting of suspended matter and removing of any discoloration, the water will be passed through special germ-proof media. Sterilizing arrangements are provided for the periodical overhaul of the filtering media. This applies equally to all portable water used. The water for drinking and cooking purposes is stored in special double-bottom tanks, having a separate pump and head tanks to enable sudden and large demands to be adequately met. The drinking water is passed through a cooler, which is part of the refrigerator installation, prior to reaching the various taps.

THE ELECTRIC INSTALLATION.—It is difficult to realize the important and extensive application of electricity on board such a vessel as the *Aquitania*. In order that it may be understood, it will be as well to furnish at some length particulars of the various uses to which current is put. There are nearly 9,000 lights in the ship and 200 electric motors. The generating plant consists of four 400-Kilowatt turbo-generator sets by the British Westinghouse Co., and the design embodies many special features. Among others may be mentioned the system of securing the turbine blades, these being of the impulse type, of steel and cut from the solid, while the dynamo commutator is of the radial type. The plant has an output the equivalent of that necessary for lighting a town of 110,000 inhabitants. The electric energy is distributed on the three-wire system, having 220 volts between the outers, and 110 volts between each outer and the middle wire. All the large motors are wound for 220 volts and are connected across the outers, while the smaller kitchen motors and all the lighting motors are arranged for 110 volts and are connected between the outers and the middle wire. The fourteen large motors which drive the twenty-eight forced-draught fans for the boilers, and the motor-driven sanitary pump are mentioned elsewhere. In addition to these, the engine room equipment proper includes motors for the engine turning gears and lifting gears, motors for operating the large sluice valves, and motors for driving the engine room and fan room ventilating fans, as also all machinery in the engineers' workshop. Electro-mechanical revolution indicators are fitted at the starting platform.

In addition to the firms mentioned in the above description, other firms who have done work for the *Aquitania* are as follows:—G. & J. Weir, Ltd., a very full range of their specialities are to be found on board; British Westinghouse and Electric Manufacturing Co., Ltd., main generating plant; Mirrlees, Bickerton & Day, Ltd., emergency electric lighting set, comprising 45-c.h.p. Mirrlees-Diesel oil engine coupled to a 30-k.w. Westinghouse dynamo; Liverpool Refrigeration Co., Ltd., refrigerating machinery; Smith, Major & Stevens, electric lifts; Jas. Howden & Co., Ltd., John Wilkes, Sons & Mapplebeck, Ltd., the condenser tubes were made by this Company; Henry Wilson & Co., Ltd., kitchens; W. C. Martin & Co., Ltd., electrical work; Brown Bros., Ltd., steering gear; United States Metallic Packing Co., Ltd., Evershed & Vignoles, Ltd., electric helm indicator; Kelvin, Bottomley & Baird, sounding machines; Stewarts & Lloyds, Metallic Valve Co., Carron Company, Carruthers & Co., Ltd., W. H. Allen & Co., Ltd., The Darlington Forge Co., Ltd., Thos. Firth & Co., Ltd., Brown, Lenox and Co., Ltd., Napier Bros., Ltd., Royles, Ltd., Railton, Campbell & Crawford, Lawrence Scott & Co., Ltd., Liverpool Engineering and Condenser Co., Ltd., John H. Wilson and Co., Ltd., Thom. Lamont & Co., Ltd., T. Downie & Co. (two sets of Willett-Bruce steam whistle control), Hingley and Sons, Ltd., Chambers, Scott & Co., Ltd., Thos. Shanks and Co., Ltd., Parsons Foreign Patents, Ltd. (Frahm's anti-rolling tanks), Wm. Giepel & Co., Ltd., steam traps; Keith, Blackman & Co., fans; The Boddy Life-saving Jacket Co., life jackets; Rich Marine Fire Indicating and Extinguishing apparatus; Welen Davit and Engineering Co., Ltd., Thornton-Smiths, decoration of smoke-room, and other firms.



The world's largest ship, *Bismarck*, on the stocks, launched 20th June. The keel was laid down in April, 1913, in the yard of Messrs. Blohm & Voss, Hamburg, for the Hamburg American Line. This is the third vessel of the *Imperator* class and will exceed the *Vaterland* in size. Actual dimensions are not known at present, but approximately she is 970 feet long over all, beam 101 feet, gross tonnage 63,000.

NAVAL ARCHITECTS, ENGINEERS AND SHIPBUILDERS IN SCOTLAND AND THE N.E.C. INSTITUTION.

THE summer meeting of these institutions, to be held at Newcastle-upon-Tyne, will be opened on July 7th, and continue until the 10th. All information for those members desiring to attend will be found in the excellently arranged programme of proceedings which has been prepared and recently issued. A number of visits have been arranged to the various shipbuilding yards and engineering works on the Tyne and Wear, and a list of firms is given whose establishments will be open for inspection by members of the institutions. Ladies are invited and special arrangements have been made for their entertainment. Garden parties will be given on the 9th of July at Lambton Castle by kind invitation of the Rt. Hon. the Earl of Lambton, K.G., and Lady Anne Lambton, and on the 10th, at Jesmond Dene, on the invitation of the Rt. Hon. the Lord Mayor of Newcastle-upon-Tyne. On this day the Honorary Freedom of Newcastle-upon-Tyne will be conferred upon the Hon. Sir Charles Parsons, K.C.B., in the Town Hall. Several papers will be read and discussed, *viz.*, on 7th July, "The protection of battleships against submarine attack," by Prof. Sir John Biles; "Recent developments of the hydraulic transformer," by Prof. H. Fottinger; "Shipbuilding practice of the present and future," by Mr. T. G. John. "Some notes on the design of floats for hydro aeroplanes," by Mr. Gilbert H. Miller. 8th July, "Some notes on warships designed and constructed by Sir Wm. G. Armstrong, Whitworth & Co., Ltd.," by Mr. J. R. Perrett; "A review of the progress in the marine steam engine on the North-East Coast during the last fifteen years," by Mr. A. C. Ross; "Charging of two-cycle engines," by Prof. B. Hopkinson; "A new type of internal combustion engine," by Mr. H. F. Fullagar; "Influence of varying temperatures on the strength and other properties of Admiralty gun metal," by Prof. A. Campion and Prof. J. G. Longbottom; "The strength of welds by the oxy-acetylene process," by Prof. A. Campion and Mr. William C. Gray; "Some experiments on a Diesel engine," by Mr. W. S. Burns.

ANGLO-AMERICAN EXHIBITION.

THIS exhibition was hardly in full swing on the occasion of our visit, portions being incomplete and it was somewhat of a disappointment that the picture gallery was closed earlier than one would have expected. It was suggested that the early closing movement was due to a safe-guarding policy in view of members of the hatchet club being abroad in place of at home. The grounds are well laid out and it is pleasant to meander round to spend a spare afternoon. The plan of the Panama Canal, which covers about 200 ft. in length and made to a scale, each mile being indicated, is very interesting, illustrating the land and water, and the difficulties met with in excavating. The distances are shown by figures giving each mile of progress, while on the walls are photographs illustrating the different stages of the work. In an adjoining building, containing models of vessels of various types, one of the most notable of which is a fine model of the *Britannic*, also one of the earlier vessel of the same name, Messrs. Vickers have some excellent models illustrative of their work.

PERFORMANCES OF VESSELS FITTED WITH DIESEL ENGINES.*

Continued from page 425.

REFERRING to the experience gained from the number of Diesel-engined vessels now running, both as to their reliability and their suitability for general service, it will be useful to note the action taken by shipowners who have obtained their experiences from their own vessels.

The Anglo-Saxon Petroleum Company and their allies, who have now had considerable experience with the *Vulcanus* and *Juno*, have no less than seven vessels now in course of construction, which will be fitted with Diesel engines. Of these three will very shortly be running. They appear to have been cautious in not attempting large powers on one shaft, as they have adopted twin screws in vessels which, had they been fitted with steam engines, would, without question, have had single screws. The East Asiatic Company have given the greatest impulse to the movement. They started with perfect confidence by ordering the *Selandia* and two sister vessels, and they have now five vessels running, and four others in course of construction by Messrs. Burmeister and Wain, of Copenhagen. They also have arranged to take out the steam engines from three vessels of their fleet and to fit them with Diesel engines made by Messrs. Burmeister and Wain, of Glasgow. This shows the absolute confidence which the Company has both in their reliability and also in their suitability for trades in which a plentiful and cheap oil fuel supply can be obtained. The Copenhagen firm of Burmeister & Wain have also in course of building four vessels, which will have Diesel engines, for the owners of the *Suecia* and *Pedro Christopherson*. The Glasgow firm of Messrs. Burmeister & Wain, besides the engines for the three vessels mentioned, are constructing Diesel engines for six twin-screw vessels being built by Messrs. Harland & Wolff at Glasgow, and are preparing plans for a single-screw vessel, which will have eight cylinders slightly larger than those fitted in the *Fionia*, which, up to the present, are the largest yet put into sea service.

The running of the *Fordonian*, *Rolandseck*, and also of the *Monte Penedo* and *Eavestone*, since the new pistons were fitted, shows that the two-cycle engine can be made as reliable as the four-cycle. The principal point upon which experience is now desired is as to whether the large sizes can be made as reliable as the smaller ones. The *Fionia* will be carefully watched, as hers are the largest cylinders yet afloat.

It is outside the scope of this paper to deal with the question of oil supplies. This will be a vital one, as it is only the question of all-round economy which will induce shipowners to depart from their old well-tried servant, the steam engine, and it is worthy of special notice that the East Asiatic Company, who have given the greatest impulse to marine Diesel engines, are having built at the present time three new vessels which will be fitted with the steam machinery displaced from three other vessels by Diesel engines, the reason being that the new steamers will be employed upon a service in which coal is comparatively cheap and oil comparatively dear.

When the performances of the vessels are carefully considered, allowances made for the fact that with all new introductions difficulties must occur, that some of the casualties which have occurred have been due to causes which have no connection with the Diesel-engine principle, and that the others have been remedied when they appeared, there is, in the writer's opinion, no reason to doubt that in a very short time still larger installations will be successfully made, and that the Diesel engine will be recognised as being equally reliable with the steam engine.

EXPERIENCE WITH VESSELS FITTED WITH DIESEL ENGINES.

The following accounts of the services of the different vessels referred to have been mainly taken from the published shipping papers. The various vessels are arranged to some extent in chronological order, but this has been departed from when dealing with some vessels which are either sisters, or have been constructed by the same builders.

The first sea-going vessel, other than small craft, to be fitted with Diesel engines was the twin-screw Italian vessel *Romagna*, built in 1910 at Ancona. Her engines were made by Messrs. Sulzer Brothers, of Winterthur. After running for a short time she was withdrawn from service, and was fitted with new or additional air compressors, and then resumed service. She, however, was lost at sea in November, 1911. It is believed that she is the only Diesel-engined vessel which has been so unfortunate.

The next vessel to be mentioned is the *Vulcanus*, which was fitted with a single-screw, six-cylinder, four-stroke cycle engine of the "Werkspoor" type. Her cylinders are $15\frac{3}{4}$ in. diam. with a stroke of $23\frac{5}{8}$ in. She commenced work in December, 1910, and was engaged on short runs in the North Sea until August, 1911, when she made a voyage to Genoa, returning to Amsterdam. She was then again employed in the North Sea until September, 1912, when she started on a Black Sea voyage. After two such voyages, in February, 1913, she sailed for Batoum; thence to Colombo, and she has since been running regularly between Singapore and the Dutch East Indian Islands. She has been frequently surveyed by Lloyd's Register, and the only troubles with her have been a burst air receiver and some ordinary defects which would occur in steam engines. Her engines have recently been surveyed, and after three years' working her cylinders have been rebored owing to their having worn slightly out of truth. There have been no difficulties with her owing to the Diesel principle, and, seeing that she was a pioneer, her success is remarkable.

The *Toiler* was built by Messrs. Swan, Hunter, Ltd. She is a twin-screw vessel of 1,659 tons gross, and was fitted with single-screw Diesel engines with eight cylinders in all, $9\frac{7}{8}$ in. diam. by $14\frac{1}{2}$ in. stroke, made at Stockholm. After a short service in home waters she started in August, 1911, from the Tees for Halifax, and arrived there in September. She was the first Diesel-engined vessel to cross the Atlantic. She was afterwards employed on the Canadian Lakes. From the particulars stated it will be seen that she has exceptionally small power in proportion to her size, and the writer has been informed by her builders that, owing to her comparatively low speed, her engines will soon be taken out and replaced by steam engines of larger power. The *Calgary* is a very similar vessel to the *Toiler*, being approximately of the same tonnage. Her engines are of the same type but are more powerful, her cylinders being $11\frac{3}{8}$ in. diam. by $16\frac{9}{16}$ in. stroke. She was built in 1912, and is still trading on the Great Lakes and St. Lawrence River.

The next to be fitted with Diesel engines was the twin-screw vessel *Selandia*, and, as she is a very large vessel engaged on long voyages, her performances have been watched with great interest. She commenced work in February, 1912, and has since traded regularly between Copenhagen and Bangkok, and is now on her sixth voyage. She has been regularly under survey by Lloyd's Register, but at no time on account of defects. On her first voyage she had two new pistons and two new cylinder liners fitted on account of some damage sustained through defective lubrication, and all her exhaust valves were then replaced by others of improved design. Any other work required on her has been such that steam engines would have needed. Altogether, especially as she was the first large Diesel-engined vessel of Messrs. Burmeister & Wain, she has been remarkably successful. The next vessel of Messrs. Burmeister & Wain was the *Christian X.*, a duplicate of the *Selandia*. She is owned by the Hamburg-Amerika Line. In July, 1912, she sailed on her first voyage to Mexico, then returned to Hamburg. She next made a voyage to Philadelphia and back without incident, sailed on her third voyage to Baltimore, met with a hurricane, and had to return to Queenstown. During the heavy weather when she had to be slowed down the fuel valves became damaged. Owing to the oil used being of an easily ignitable character, the valve setting suitable for full-power running with slower burning oil gave too much "lead" when running slowly, and caused the damage. After a very slight delay she resumed her voyage, and has since been running regularly between New York and Brazil. In January last she met with her first serious trouble, the outer water jackets of some

* From a paper read by Mr. J. T. Milton before the Inst. of Naval Architects.

of her cylinders becoming cracked. The cause was attributed to scale forming on the inner liners, and thus permitting them to become over-heated, their expansion cracking the outer jackets. Other nearly similar vessels built by the same firm are the *Suecia*, *Siam*, *Annam*, *Pedro Christopherson*, *California*, and *Fionia*. The *Suecia* is similar to, but rather smaller than, the *Selandia*, and has the same arrangement of auxiliaries. She commenced work in December, 1912, trading between Stockholm and South America. On her second voyage she met with the accident to her air receiver already referred to in the paper. She has since been regularly at work, and is now on her fourth voyage, and no further troubles have been reported. The *Siam* is also a similar vessel, but rather larger than the *Selandia*. She commenced work in April, 1913. Her sister vessel *Annam* commenced work in June, 1913. Both have continued steadily in service, and no incidents of any kind have been reported in either of these cases. The *Pedro Christopherson* is sister to the *Suecia*. She commenced work in August, 1913. Like her sister she is engaged in South American trade, and the only casualty which has been reported in her case was a collision with a quay wall. The *California*, whose engines are slightly larger than those of the *Selandia*, commenced work in October last, and is engaged in the North Atlantic trade. No casualties of any kind have been reported in her case. The *Fionia* is the vessel with the largest cylinders yet in use in any Diesel-engined vessel. She has twin-screw engines of a total of 4,000 I.H.P. There are six cylinders to each shaft, the diameter being 29 in. and the stroke 43 in. She had a very successful trial in December last, and on January 13th started on her first voyage. She returned to port next day with serious trouble to her air compressors, which were of different type from those previously used by Messrs. Burmeister & Wain. These have now been replaced by others of different design, and the vessel has again started on an Eastern voyage.

The *Jutlandia* is a sister vessel to the *Selandia*, but was built and engined in this country by Messrs. Barclay, Curle and Co. After a delay caused by a mishap, which occurred on a trial trip, to a part of the mechanism not connected with the Diesel cylinders, she started her first Eastern voyage from Copenhagen in August, 1912. She is now homeward bound on her fourth Eastern voyage. On the outward voyage, it is stated in the shipping papers that she collided with a floating derelict off Cape Finisterre, and damaged one of her shafts. Except for this accident, which has nothing to do with the Diesel principle, she has been remarkably successful.

All the foregoing vessels have four-stroke cycle engines.

The next vessel to be referred to is the *Eavestone*, which has two-stroke cycle engines of the Carels type. She commenced work in July, 1912, made some short runs in the North Sea and Baltic, thence to Spain, and then crossed the North Atlantic. On her return she put into Fayal with machinery disabled, in January, 1913, and from the shipping papers it appears that new pistons and new cylinder covers had to be sent out to her to enable her to complete her voyage. She arrived in the Tees in March; and remained there, presumably under repair, till July 1. During the remainder of last year she was regularly engaged between the United Kingdom and Baltic ports. Early this year she sailed for the Mediterranean, where she is at present at work.

In August, 1912, the *Monte Penedo* commenced work. Her engines are two-stroke cycle, and were made by Messrs. Sulzer Bros. On her first voyage she arrived at Buenos Aires in October and remained there until the following January, when with new pistons which had been sent out to her, she made her return voyage to Hamburg. She has since then been regularly at work on the United States and Brazilian coasts without any delays.

In November, 1912, the *Rolandseck* commenced work. Her engines were made by Messrs. Tecklenborg, and are of the two-stroke Carels type. The papers show that she has since been running regularly between Portuguese ports and Hamburg. The only casualties reported being very slight, and to the hull only, no mention being made of the engines.

In the same month the *Juno* commenced work. She is an oil tanker, and is fitted with single-screw, four-stroke engines of the " Werkspoor " type. Soon after starting she had a cylinder renewed. The defect which had occurred was attributed to locally deficient water circulation. This was remedied. She was first engaged on some short runs, but in January of last year she left Rotterdam for the East, where she has since been engaged running between the Dutch East Indies and Singapore with great regularity.

About the same time the *Emanuel Nobel* commenced work. She is also a tanker, but is fitted with twin-screw engines, each of which was a duplicate of those of the *Juno* Similar defects to those which had shown themselves in the *Juno's* cylinders were similarly remedied. Since then she has been kept constantly at work, and the only casualties reported are slight damages due to collision, and to heavy weather, and there is one record of her having put into port with overheated bearings.

The *Loudon* is a single-screw vessel fitted with sister engines to those in the *Juno*. She commenced work in November of last year and has since been employed in regular work in the Dutch East Indies. The only casualty reported in her case was that she anchored at Dungeness on November 24 at 6-20, and signalled " defect," and proceeded at 8-23 the same evening.

Towards the end of 1912 the *Fordonian* was completed, and had a very successful trial. Her engines were made by the Clyde Shipbuilding and Engineering Company, of Port Glasgow, upon the Carels two-stroke design, and were very similar to those of the *Eavestone*. She started on a voyage to the Canadian Lakes for service upon which she was intended. She returned to port through trouble with bilge pumps, and with air compressor. These were remedied, but owing to the lateness of the season she was laid up at Greenock until May, 1913. During this time her cylinder covers, which were of cast steel, were renewed with others of cast iron, as the result of experience with other engines, not on account of developed faults. Nothing else was done to her engines, and in May she started a non-stop run to Quebec. She has since been running regularly and satisfactorily on the Canadian Lakes until the close of the season.

In May, 1913, the *Hagen*, built by Messrs. Krupp, of Kiel, started on her first voyage. She is a twin-screw vessel, having six cylinders to each shaft. They are of the two-stroke type. The two air compressors are worked by auxiliary oil engines, each being large enough to supply both engines. Her first voyage was to New York, on her return the air compressors gave much trouble, and she was more than three months under repair. One of her compressors was renewed at this time. She commenced her second voyage to New York in November last, and has now made two more voyages, during the last of which some of her pistons, both of the main and of the auxiliary engines cracked. These pistons are cooled with fresh water. It was found that the circulation of the water had been partially obstructed through sediment from the water. The passages have now been enlarged to ensure a better circulation. The *Loki* is a sister vessel to the *Hagen*. She commenced work on October 30, sailing between Hamburg and Philadelphia. She arrived back in December, when her engines were opened out for thorough examination, and sailed again in January for New York. It is reported in the papers that she remained in New York for 16 days repairing, and she is now on her homeward run to Hamburg.

The *Wotan* is the Diesel-engined vessel with the largest power on one shaft yet afloat. She has a single screw, there are six cylinders, each 23⅝ in. diameter, by 43 in. stroke, working on the two-stroke cycle. They were made by the Reiherstieg Company, of Hamburg, on the Carels two-cycle plan, and indicate 2,300 h.p. After a successful prolonged trial she left Hamburg in September last for New York, and returned to Hamburg after the voyage without incident. On arrival her machinery, including the air compressors, was overhauled, and was all found in order. On attempting to start, trouble was experienced with the compressors, and the vessel was delayed for several days. She then started on a second voyage to New York, during which two crank-pin brasses gave trouble. As there was only one spare one on board this was fitted, and the vessel proceeded with five out of her six cylinders in action, and arrived at New York only a little late. Her return was without incident. On her third voyage outward she put into Plymouth, with the air compressor deranged, and was repaired there. After about three weeks' detention she again sailed on her present voyage.

The French barque *France* fitted with Carels' type of engines has twin screws. Besides being of good mechanical power, she is rigged as a five-masted barque and has full sail power. She started on her first voyage in November last, and has reached her destination in New Caledonia, and no casualties are reported.

The *Arthur von Gwynner* is fitted with four-cylinder Junkers engine, not of the tandem type. She started service in November last, and so far her work has been satisfactory; no delays or casualties have been reported.

The *Sebastian* is the most recent Diesel-engined vessel to be put into service. She is twin screw, with engines made at Stockholm. She has just started on her first voyage, and has been reported as being "all well."

Mention ought to be made of the *Tynemount*. She was fitted with two Diesel engines, made by Messrs. Mirrlees, Bickerton & Day. Each engine drove an electric alternator, which was connected to a motor upon the screw shaft. The vessel and her machinery were described in a paper read at the Summer Meetings of the Institution in 1913.* So far the electrical portion of the equipment has not answered expectations. The difficulty, however, does not lie with the Diesel engines.

Concluded.

INSTITUTE OF MARINE ENGINEERS.

Visit to Works of Messrs. J. & E. Hall, Limited.

On June 6th, a very interesting visit was paid by members of the Institute of Marine Engineers to the Works of Messrs. J. & E. Hall, Limited, Dartford. Founded in 1785, the manufactures for which the firm originally gained a reputation included paper-making machinery, gunpowder plant, marine and beam engines, elephant boilers and all classes of mill work. The first trunk engines ever made were designed and constructed at the Dartford Ironworks, and as long ago as 1836 a pair of 60" beam engines, fitted with surface condensers, were designed and made there for the s.s. *Wilberforce*.

The carbonic anhydride (CO_2) refrigerating machines for marine and land work, the manufacture of which has made the firm so justly famous, were introduced by them in 1888. The facilities for the construction of these machines, and of the "Hallford" heavy motor vehicles—a recent and equally successful branch of the Company's activities—are of the most modern description, and are a testimony to the enterprise of the present directorate.

In the pattern shop, plans and photographs of some of the larger orders in hand were examined. The marine type most in use in the larger vessels is the Duplex machine, fitted with triple-expansion steam cylinders, the high and intermediate cylinders being on one side and the low-pressure cylinder on the other, with a steam surface condenser in the front part of the machine. The two machines are so arranged that either or both sides can be worked jointly, or if desired, one side (*viz.*:—one compressor with its condenser and evaporator) can be disconnected and the other side worked by itself, the full advantage and economy of the triple-expansion engine being retained. This type of machine is designed to suit the limited height of the 'tween decks, the largest size being less than 7 ft. in height.

The machinery throughout the works is driven by electric power, which is obtained from two 350 h.p. Willans engines, each coupled direct to a 220 kilowatt E.C.C. generator. For electric welding there are two motor-generators of 35 kilowatts each, and a 52 kilowatt motor-transformer, which changes the continuous current to alternating current. Another transformer is used for reducing the pressure of the public supply from 460 volts to the works standard of 120 volts.

In the machine and erecting shops, which naturally cover the larger part of the workshop area, the various stages of construction of compressors, condensers, etc., were seen. In these shops are some of the best types of modern machines, including a large hexagon turret lathe and other semi-automatic lathes, automatic stud-making and other machines. The boring machines are necessarily of the best type, the compressors for the large refrigerators all being bored out of the solid steel forgings. A detail of interest is the disc safety valve, which is an important feature in the Hall machines. It consists of an ordinary spring safety valve, at the base of which is a thin copper disc, which ruptures when the pressures come below that to which the machine as a whole is tested.

In the coppersmith's shop the method of brazing the pipes in the construction of the grids was demonstrated, also the various tests to which the copper is subjected. End-joining of the pipes by electric welding was also shown, this method having been found to give the best results without danger of swelling or constriction of the metal. An ingenious pipe-bending machine, designed and made in the works was also inspected.

After visiting the foundry, which is at present undergoing considerable extensions, the party was conducted through the new works for the construction of heavy motor vehicles. The machine and erecting shops are under one roof, the stores being placed centrally between them. In addition to overhead cranes in each bay, the whole of the works is intersected by a system of light tramways. The machine tools are of the most modern pattern, highly specialized for the work, systematically grouped and driven by electrically operated line shafting, each group of tools having its own drive. Capstan and other lathes, multiple spindle and capstan head drills, milling and gear cutting machines are well represented. Ample provision is made also for the case-hardening and heat treatment of the various parts.

An interesting demonstration was given of the method by which the efficiency of the refrigerators is accurately tested.

The party was afterwards hospitably entertained to tea, and votes of thanks to the firm and to the gentlemen under whose guidance the visit was made, were proposed and seconded by Mr. Jas. Shanks and Mr. E. Seabury respectively. Mr. Willcox and Mr. Buchanan responded on behalf the firm.

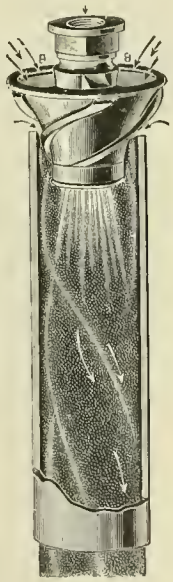
*See MARINE ENGINEER & NAVAL ARCHITECT, November, 1913.

SHIPPING, ENGINEERING AND MACHINERY EXHIBITION.—It is stated in the latest report in connection with this Exhibition that most of the space available for exhibits has now been booked. The most recent additions to the firms who have been provided for are, The President of Administration, Lisbon; Messrs. Gradwell & Co., Ltd., Barrow; Valor Co., Ltd.; The Interlock Metal Hose Co.; United Kingdom Self-adjusting Metallic Packing Syn., Liverpool; Messrs. Musgrave & Co., Ltd., Belfast; Pitters Ventilating and Engineering Co., Ltd.; Messrs. Silversteen & Co.; The London Electric Firm; C. D'Oyley Hutchins; Talykron, Ltd.; Messrs. S. Smith & Son; Messrs. Yetton & Brockett; The Crosby Steam Gauge Co.; Fred T. Jackson, Telephone (New) System, Ltd.; Messrs. McLaren Bros., Dumbarton; Messrs. Geo. D. Gibson & Co., Glasgow; Petrolite Ltd.; Messrs. A. C.

Lyon & Co. Exhibits are being arranged for in the gallery as well as in the body of the hall, the former will include loan exhibits from different societies connected with the interests represented in the Exhibition. A section will be devoted to training-ships and is in course of being organized. The opening ceremony arrangements have been approved by Admiral H.S.H. Prince Louis of Battenberg and the other ceremonial gatherings are under consideration, including an "at home," when Sir Archibald and Lady Denny will receive the guests. Capt. H. Riall Sankey has consented to give an illustrated lecture on "Wireless." Other subjects and authors so far arranged are "The Gyroscope," by Mr. Shilowsky; "Engineering as applied to Navigation," by Mr. A. H. Binyon; "Internal Combustion Engineering," by Mr. E. Shackleton; "Steering and Stability and the application of the Gyroscope," by Mr. E. Kilburn Scott; "Lubrication" by Mr. J. Veitch Wilson. The evenings set apart for these lectures are Sept. 28th and 30th, Oct. 2nd, 5th, 7th and 12th. It is interesting to note that the firms whose connection with the Machine Tools Association brings them under the ban, forbidding them to exhibit their specialities as applied to shipbuilding and marine engineering at Olympia, have before them the view of other firms connected with the Association, who are exhibiting specialities which appeal to colliery and other engineering plant, and the questions arise, where is the line drawn and why should some specialities be penalized? The desirability of forming a kindred association, embracing the tool makers who manufacture for shipbuilding and marine engineering workshops, has been suggested, so that there may be no injustice done to them by regulations which affect other manufacturers in a different way.

THE "DALMAR" TUBE CLEANER.

WE have much pleasure in illustrating a form of smoke tube cleaner, the invention of Mr. A. Dalmar, Rouen, which has been largely used on the continent, and is being introduced in London by Messrs. A. Duncan & Co., of 98, Victoria Street. The blower is similar to several now on the market for this purpose, and uses steam and air blast. The steam being led through a central nozzle induces a current of air through the cone, and by means of vanes is given a gyrating motion which assists in projecting the blast round the tube walls. The nozzle enters the tube a short distance, as shown in the illustration.



The effect of the large volume of air is stated to be that the moisture in the steam is reduced and does not deposit on the tubes. The problem of getting a dry blast is not easy of solution, and whatever water may be carried over with the steam readily mixes with the soot in the tubes and renders a blast of little value. This difficulty has been foreseen and the arrangement has been designed to meet it. The reduction of pressure from the boiler to the nozzle is calculated to dry the steam, but unless the pipe be well drained and superheating or jacketing employed, it is difficult to ensure an all-steam dry blast. From the large number of these appliances which have been fitted, it seems evident that they have proved efficient and valuable.

The same firm manufacture tube cleaners for water-tube boilers for internal and external use, the former being hydraulic with a turbine arrangement of scaling hammers, the latter being in the form of a lance, to pass between the rows of tubes, which will project an air blast for a distance of eighteen feet.

The list of firms using these tube cleaners covers most of the countries on the European seaboard, and each boiler is considered on its merits, the connections and the design being made to suit special cases.

MR. JOHN SHERRATT.

THE General Superintendent of the White Star Line at Genoa, Mr. John Sherratt, is about to retire, after thirty-two years of active service, and has been presented with a silver salver by his employers, this handsome piece of plate being exhibited in Messrs. Elkington's window.

Mr. Sherratt is a Liverpool man by birth, and after serving his engineering apprenticeship with Messrs. Hodge, Hyslop, Dunlop & Co., joined the historic Liverpool firm of Fawcett, Preston & Co. He entered the service of the White Star Line as sixth engineer of the *Germanic* in 1882, and in subsequent years was engaged in many well-known steamers of the Line, including the *Celtic* (No. 1), *Republic* (No. 1), *Baltic* (No. 1), *Teutonic*, *Runic* (No. 1), *Cufic* (No. 1), *Majestic*, *Adriatic* (No. 1), *Cevic*, *Nomadic*, *Cymric* and *Romanic*.

Mr. Sherratt was appointed General Superintendent to the White Star Line at Genoa in 1904, since when he has ably acted in that capacity. He holds the commission of Senior Engineer in the Royal Naval Reserve.

It is understood that Mr. Sherratt, on retiring into private life, will take up his residence in Liverpool, and the best wishes of shipping people generally, and the members of the engineering profession in particular, will accompany him there.

OBITUARY.

Mr. F. J. Trewent.

It is with extreme regret that we have to record the death of Mr. Francis James Trewent, which occurred on the 17th May at his residence at Hampstead, as the result of heart seizure. As an engineer and naval architect who has been associated with the introduction of many inventions fitted into steamships, Mr. Trewent was well known, not only to the naval architects in this country, but also to a large number of people who are interested in the mercantile marine. Born on June 21st, 1850, at Neyland, in Pembrokeshire, spending his earlier years on the shores of Milford Haven, his interest in the sea became strongly developed, and at sixteen years of age he entered the Royal School of Naval Architecture at South Kensington, where he had the companionship of fellow students who attained the highest distinction, such as Sir William H. White, Dr. Francis Elgar, Dr. Thearle, and Sir Philip Watts. After undertaking a certain amount of practical work at Pembroke Dockyard he became junior draughtsman in the shipbuilding yard of Messrs. Robert Napier & Sons, which is now that of Messrs. William Beardmore & Co., and during this period considerable pioneer work was carried out in the construction of warships and mercantile vessels. At the age of twenty-one he secured an appointment with Messrs. Wigham, Richardson & Co., of Newcastle-on-Tyne, and after spending about a year in that position, he went to Messrs. Earle's shipyard at Hull, where he remained for ten years and rose from the position of junior draughtsman to that of chief draughtsman, ultimately taking up the position of assistant yard manager. On leaving Earle's he went to Messrs. Swan & Hunter as general manager, during which service there were great developments in the construction of high-class ships and large extensions were made to the various factories. After leaving Messrs. Swan & Hunter in 1887, he became manager of the Hebburn-on-Tyne yard of Messrs. Hawthorn, Leslie & Co., and during his four years' occupation of this post, the 20-knot steamer *Orel*, of the Russian Volunteer Fleet, and H.M. cruiser *Bellona* were built. In 1891 Mr. Trewent came to London and started in business as a naval architect and consulting engineer, and his practice developed the firm of F. J. Trewent & Proctor, Ltd., which represented the merchant shipbuilding branch of Messrs. Armstrong, Whitworth and Co. Mr. Trewent was a member of the Institution of Civil Engineers and also of the Institution of Naval Architects, and other technical societies.

Engineer Rear-Admiral Wishart.

We feel sure that deep regret will be felt by the engineering officers of His Majesty's Navy as well as contractors for naval machinery on learning of the death of Rear-Admiral Wishart, whose death has occurred in his sixty-second year. This officer, having attained the age limit retired some sixteen months ago, but his health has not been good for some time past, and a recent family bereavement in the fatal accident to his son had gravely affected his condition. He was an engineer student at Woolwich and Keyham and left the latter establishment in 1874, passing as assistant engineer second class. In the session of 1874-1875 he was selected for a two-years' period of advanced course of study, and in September, 1876, was promoted to assistant engineer first class. From September, 1877, to April, 1880, he served in H.M. troopship *Crocodile*, during which time he was promoted to engineer, and from April, 1880, to November, 1882 he served in the *Isis* in the Mediterranean, after which he went to the Bermuda Yard, where he remained until appointed for service in the Admiralty in 1885. He occupied the post of Supernumerary Assistant to the Chief Engineer at Portsmouth Dockyard, from March, 1886, to April, 1887, when he became Admiralty Engineer-Overseer in the Clyde district, and was promoted to Chief Engineer on September 21st, 1887. In December, 1888, he returned to Portsmouth Dockyard as second assistant to the chief engineer, and was appointed first assistant in 1890, and on September 21st, 1891 he was promoted to staff engineer. In connection with machinery building by contract under the Naval Defence Act of 1892, he was employed by the Admiralty. In June, 1893 he went to sea as staff engineer on H.M.S. *Anson* in the cruiser squadron, and also served in the same ship in the Mediterranean, being advanced to fleet engineer in 1895, soon after which he returned to England. He was appointed in December, 1896, to supervise the building of the machinery of the battleship *Albion*, and remained in that ship until April, 1899, when he was appointed to H.M.S. *Warspite*, the flagship of the Pacific Fleet. His next rank was that of inspector of machinery, subsequently changed to that of engineer captain, and in May, 1902, he was the chief engineer of the Malta Dockyard, which position he occupied for five years, and returned to England in July, 1907, to become the manager of the engineering department at Devonport Dockyard, and during this appointment he was promoted to the rank of Engineer Rear-Admiral. In October, 1909, he was appointed to the *Victory* for service on the staff of the Commander-in-Chief at Portsmouth.

In the many important posts that he occupied in the service his administrative qualities were highly appreciated and his personal characteristics won for him the respect and regard of all those with whom he came in contact in connection with work at private shipbuilding yards, in carrying out his duties of inspecting officer, and later in the work he carried out at the dockyards when he was chief engineer. It is not therefore surprising that Engineer-Admiral Wishart was extremely popular and was held in high regard by his brother officers. For service during the Egyptian War, when he was serving on the *Isis*, he was awarded the Egyptian Medal and the Khedive's Bronze Star.

Sir Joseph Swan.

News of the death of the well-known scientist, Sir Joseph Swan, will be received with deep regret by all those who have watched the development of electric chemistry during the past fifty years, particularly as his name has been inseparably associated with the invention and development of the incandescent electric lamp. Sir Joseph died on May 27th, at his residence, Overhill, Warlingham, Surrey, in the 86th year of his age. He was born at Sunderland on October 31st, 1828, and was apprenticed to a firm of druggists. He found at the end of his apprenticeship that the form of technical education in chemistry was so unsatisfactory that he obtained employment at Newcastle in a chemical business in connection with Mawson, who subsequently became his partner and brother-in-law, and under their joint labours the firm's business developed to an enormous extent, particularly in the manufacture of photographic chemicals. Sir Joseph Swan was recognised as a leading authority on electro chemistry and his work in connection with the electric glow lamp dated from the time when, as a youth of seventeen, he saw Staite's incandescent wire of platinum-iridium alloy. It would appear from history that he was really the first to fully grasp the advantages of the use of carbon as a material for the filaments of incandescent lamps, and in 1860 he made such filaments by heating strips of paper packed in crucibles with powdered charcoal and mounting these carbonized strips in glass vessels exhausted of air; he raised them to a red heat by means of an electric current obtained from primary batteries. His difficulty was the production of a sufficiently perfect vacuum in the glass vessel, with the result that the carbon soon became consumed, in addition to which may be pointed out that even if he had effected this purpose the day for the economic production of electric current had not arrived, and until then his carbon lamp would never have achieved any commercial success. Seventeen years afterwards he attacked the problem again, owing to the invention of the Sprengel mercury air pump, and in 1879 he exhibited his lamp at a meeting of the Newcastle Chemical Society, and his first considerable public display of the new illuminant was given in the lecture room of the Newcastle Literary and Philosophical Society in October, 1880. It is interesting to note that at that time there were only two houses in this country lighted by electricity, his own and the late Lord Armstrong's. The development of the process of making filaments by the carbonization of paper was found in the favour of another process in which cotton thread was parchmentized by immersion in dilute sulphuric acid and carbonized, which was later substituted by the process of squirting a viscid solution of pure cotton wool in some solvent such as chloride of zinc by means of pressure through a small orifice, the resulting thread being formed into the shape of filaments and then carbonized. Space prevents us from dealing with the results of Sir Joseph's extensive researches

of the extent of which the records of the patent office give some idea. France was the first to recognise Swan's services to applied science and made him a Chevalier of the Legion of Honour in 1881, and it was not until 1904 that his own country officially acknowledged his achievements by a knighthood. He was elected a fellow of the Royal Society in 1904, and ten years later was awarded the Hughes medal. He was elected president of Electrical Engineers in 1898, and served as president of the Society of Chemical Industry in 1901, while in 1903 he was chosen the first president of the Faraday Society. The Newcastle City Council recently decided to confer upon Sir Joseph Swan the freedom of the city in recognition of his achievements, but this step was not concluded, although the necessary preparations were in progress at the time of his death.

Matthew Clover.

We regret to report the passing away of this well-known and respected Merseyside shipbuilder at his residence, at Willaston, Cheshire, in his 67th year. Mr. Matthew Clover had retired from active service with the well-known firm of shipbuilders and repairers, Messrs. Clover, Clayton & Co., of Birkenhead, about three years ago, after an association of forty-seven years. During this long connection Mr. Clover was a partner with his father, and later managing director with his brother, the late Mr. G. R. Clover. This firm have in the past been responsible for the construction of many famous vessels, such as the *Houghton Tower*, for Messrs. Ismay, Imrie & Co., the *British Princess* for the late Mr. James Beazley, and many others. Ship repairing only is now carried on at these extensive works, which comprise six graving docks, together with extensive plant associated therewith, all of which have recently been brought up-to-date. Mr. Clover leaves four sons, Mr. M. Clover and Mr. —. Clover being associated with Messrs. Clover, Clayton & Co., besides a wide circle of business and personal friends, amongst whom the remembrance of his genial and generous qualities will have a lasting place.

Mr. J. G. Robertson.

We regret to record the death of Mr. Joseph Gibson Robertson, of 6, Claremont Road, Forest Gate, which took place after a few days' illness from acute pneumonia. He was the eldest son of Mr. A. W. Robertson, of Messrs. A. W. Robertson and Co., of the Lea Shipbuilding yard, Canning Town, and

a son-in-law of ex-Alderman G. W. Kidd, of Wanstead. Although he took no part in public affairs, his natural modesty and kindness endeared him to a wide circle of friends, and he especially earned the regard and respect of the workmen of the shipbuilding yard. He was only thirty-eight years of age, and he leaves a widow, but no children.

CORRESPONDENCE.

To the Editor of THE MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—I have been interested for some time past in the letters published month by month in your journal, dealing with the encroachment by the Board of Trade on sea service in favour of "desk" service as a qualification for their certificates of competency.

Although the points touched upon are so numerous as to pretty well cover the ground, I should like to add my quota to the succession of criticisms which have appeared against what, to all appearances, will ultimately destroy the value of the Board of Trade certificates as the criterion of practical engineering.

The Board of Trade being in existence for the benefit of the nation at large, I presume that the effect of the extension of the sea service necessary was mainly to ensure that the men, on whom the safety of the ship and its passengers in so great a degree rests, should be as fully equipped by experience as possible. It is surely apparent to all that the present regulations are obsolete and that the extension of the qualifying sea service is at least a step in the right direction. By merely reviewing the present state of affairs, this is seen to be so, for, comparing a small tramp steamer of about 1,000 h.p. with the newly-built *Aquitania*, the number of engineers to be carried, according to regulations, is one first-class and one second-class in each case. Can this be adequate in both cases, I ask, and further, is this safeguarding the public interests? Need more be said?

The new regulations are, on the face of it, increasing the sea service necessary by one-half, but, intrinsically, only by *one-fourth*, and dealing with the above mentioned effects to be produced by these regulations, how much will an engineer become expert by this extra three months sea service when he cannot spend the following 4½ months in school? Will he, at school, receive the training necessary to a man who has so often, in times of great nerve strain, to act on the spur of the moment in order to save the ship from disaster or the machinery from breakdown? Will he there cultivate the instinct that enables the experienced engineer to diagnose the case of an engine under his charge as a physician does that of a patient?

Lastly, as to the value of these marine certificates ashore, they will surely be scorned and their holders be derided because they may spend some months of the vaunted "practical sea experience" at school. It is to be hoped that the Board of Trade will seriously consider the advisability of revising these regulations before they come into force six months hence.—Yours faithfully,

ENGINEER MANAGER,
Ex-ch. Cert.

Lee, Kent, June 10th, 1914.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

DESIGN OF LIFEBELTS.

Sir.—In reply to the question regarding lifebelts, which was asked in the House of Commons on the 11th June, the President of the Board of Trade is reported to have said: "It is very difficult indeed to get any type of life-belt, life-jacket, or life-buoy to suit every age, every size, and every type of passenger." As I have been working for a considerable time to meet those very difficulties, will you kindly allow me to state that I have now overcome them, and made a life-jacket which is suitable for "every age, every size, and every type of passenger." This jacket has been thoroughly tested by the Board of Trade, from whom I have received seven certificates for different patterns. The last jacket I have made is Pattern 4, and the specification states as follows:—"The buoyancy being so distributed as to turn the wearer, when helpless, automatically backward with the head out of the water, the head resting on the back pad. This Jacket is adapted to large or small persons, being suitable for men, women and children, and will fulfil the foregoing conditions." But not only is the jacket efficient as above described, it is also full of comfort to the wearer, the warmth penetrating through the breast to the whole system. This is of advantage to passengers when having to wait, with

the jacket on, also when in the water, or sitting in the lifeboat. It is quickly put on and the arms are free for rowing, etc. It is soft to the face and to the figure, a protection to the body in case of a blow, and should the wearer have to jump into the water from a height, that can safely be done, the wearer being brought immediately to the surface with head well supported out of the water, owing to the construction of the jacket. A frightened or insensible person is well protected, and anyone unable to swim can propel themselves along, either on their breast or back. The jacket has sufficient buoyancy to support two people. The "Boddy" jacket, Pattern 4, takes up but little space, weighs under 2lbs. and is inexpensive. It is now being adopted by a number of shipping companies and is an additional safeguard to the travelling public.—I am, Sir, Yours obediently,

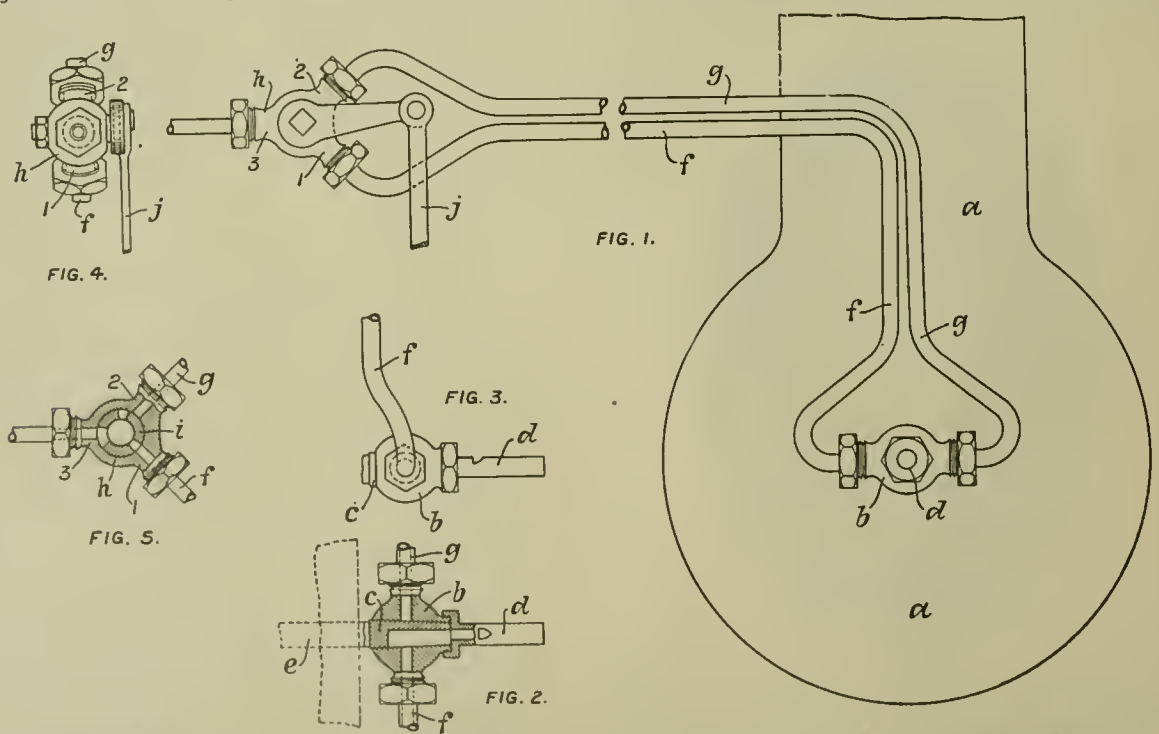
G. M. BODDY.

8, Leadenhall Street, London, E.C.,
16th June, 1914.

ENGINE-ROOM TELEGRAPH ALARM.

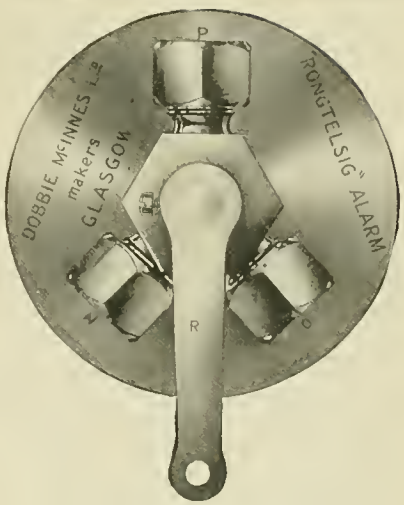
ONE of the most disquieting comments which the captain of an outward-bound steamer can hear from one just entering port is to the effect that there is fog outside, as the ordinary sea risks are added to by that of collision. The anxiety is shared by all on board, and with the knowledge that on the instant and correct movement of the engines may depend the safety of the ship and that of others, everyone is on the alert. Not only during a fog is it necessary to be on the look-out for sudden reversals of the engines, but also in narrow waterways and harbour approaches. Occasionally, at the moment of a sharp summons, a mistake is made in giving or in executing an order, and ere this is discovered much damage may be, and has occasionally been done. A very simple and effective device has been designed and patented by Mr. J. D. Smith, for the purpose of giving an instant warning whistle to the engineer working the engines to the telegraph, in the event of the gear being put the wrong way. The device in question is an improvement on a former design illustrated and described in our issue of December, 1912. The new design is fitted to the twin engines of the steamer of which the patentee is chief engineer, the British India Co.'s t.s.s. *Takada*, and the sole makers acting on behalf of the patentee are Messrs. Dobbie, McInnes, Ltd. Fig. 1 is a general view of the apparatus as applied to the engine-room telegraph. Figs. 2 and 3 show the cock *b*, and whistle *d*. Figs. 4 and 5 show a three-way cock *h*. The cock *b* has a hollow plug *c*, communicating with a whistle as *d*, which is connected to the barrel of the cock, it in turn being controlled by the motion of the pointer-shaft of the dial of the telegraph, as per the dotted lines on Fig. 2. One end of the plug *c* is attached to this shaft. The cock *b* is connected by pipes *f g* to two branches, 1 and 2, of the three-way cock *h*, and the other branch 3 is connected to the condenser. The plug *i* of this three-way cock is made with three ports and is connected to the reversing lever *j*, the upper shaft or other suitable moving part of the gear to obtain the motion.

When the telegraph is rung up and the order shown on the dial, the pointer-shaft *e* moves the plug of the cock *b* in the direction indicated, ahead or astern, as the case may be. The cock is closed to both pipes *f* and *g*, till the movement of the shaft *e* opens either for *g* into direct communication with the cock *h*. Should the dial indicate ahead, communication is opened between the whistle and the astern pipe *f*, through the plug *c* of the cock *b*, and is closed between the whistle and the ahead pipe *g*, so that if the engines are operated correctly, the plug *i* of the cock *h* will be actuated by the lever *j*, thus shutting off communication with the

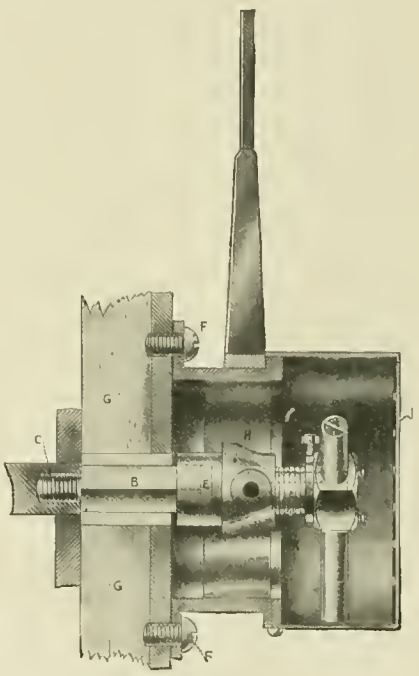


Smith's Patent Audible Engine-Room Telegraph Alarm (Messrs. Dobbie, McInnes, Ltd., Glasgow).
(General arrangement of pipes.)

Smith Engine Room Alarm.
Front view, showing cock, triple reed arrangement and perforated disc at back through which the air is drawn by the condenser.



Three-way Cock arrangement



Side view of Audible Alarm mechanism, showing method of attachment to the engine-room telegraph.

astern pipe *j*, and opening to the ahead pipe *g*, no sound will then result. In the event of the lever *j* being moved in the wrong direction and the engines placed for astern movement, the lever *j* will shift the plug of the cock to the astern pipe, and the whistle in communication with the condenser, thereby causing an alarm from the whistle, which will continue to blow till the correct movement is made. The device is simple, effective and inexpensive, qualities which commend it for the purpose intended. The present arrangement is as sharp in acting as the former one previously referred to and less liable to get out of order; the alarm is given before the engines are moved.

INSTITUTE OF MARINE ENGINEERS.—The examination of candidates for the Lloyd's scholarship has been announced to take place on July 1st and 2nd. There are fifteen applicants located as follows—Clyde district six, London district four, Liverpool district three, Newcastle district one, and Hull district one. The examinations will be held simultaneously at the various centres; the questions and instructions in connection with the examination will be issued from 58, Romford Road. The subjects for examination are: Arithmetic and algebra, elements of statics, dynamics, thermodynamics, and hydrostatics, geometry (Euclid books I. to IV.), general knowledge, grammar and composition, mechanics, principles and problems, modern language, plane trigonometry, (including Logs), practical engineering and workshop practice. The scholarship is £50 per annum, tenable for two years. It was installed in 1908 and those who have gained the scholarship have obtained degrees at the University attended. Mr. Ian Garvie, the recent holder of the scholarship, obtained B.Sc. at Glasgow University.

MR. W. RYDER RICHARDSON, the well-known secretary of the Royal St. George's Golf Club, Sandwich, Kent, where the contest for the Amateur Championship took place recently, says that for watering the greens of the golf course he has not found any hose that stands such hard wear as the Dermatine Hose.

INSTITUTE OF METALS.—Portsmouth has been selected as the place of meeting for the Autumn Conference of the Institute of Metals. The Conference, which will be presided over by Engineer Vice-Admiral Sir Henry J. Oram, K.C.B., F.R.S., the President of the Institute of Metals, will be held on September 10th and 11th, in the Municipal College, a number of important papers being read each morning. In the afternoon of September 10th a visit will be paid to Portsmouth Dockyard, and there will be a dinner in the evening. On September 11th the afternoon function will consist of a luncheon at the Cowes works of Messrs. J. Samuel White and Co., the works afterwards being visited.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Foreign Material and Fresh Work.—The competition of Continental manufacturers in supplying shipbuilders and engineers with steel and iron, both in the rough and in the semi-finished state continues to cause home manufacturers much concern and positive loss. Big consumers of steel and iron, engaged in shipbuilding, as well as in structural engineering generally, are freely placing orders with German and Belgian concerns, and material is being used at far under home makers' prices. Conferences of the home iron and steel firms are being held to determine whether a means of relief cannot be formulated. Whether a readjustment of home prices will be forced remains to be seen, but meantime the shipbuilder benefits, he is enabled to quote temptingly, and in consequence there are still a goodly number of orders for fresh tonnage being booked.

Messrs. William Chalmers & Co., of Rutherglen, have received an order for two vessels of light draught construction, each of 170 ft. in length for foreign owners. The order is of special interest in view of the fact that the vessels will be the first of light-draught construction to be built on the Isherwood system, and that they will be shipped to their destination in pieces and thus exemplify how this system of construction lends itself to ready dismantling and re-erection abroad. Commenting on this order several of the Glasgow newspapers inform their readers that "the difference between the Isherwood and the ordinary method of building ships lies in the plating. Practically every vessel is plated horizontally, but the Isherwood vessels are plated vertically"! The knowing reporter is here once again deplorably at fault. The Isherwood system, as our readers well know, has little or nothing to do with the plating, but the framing is essentially longitudinal instead of transverse, as in ordinary ship construction.

Messrs. Alex. Stephen & Sons, Ltd., Linthouse, have received from Messrs. Furness, Withy & Co., London and West Hartlepool, the order for a large meat-carrying steamer. The stocks at Linthouse continue to be well occupied and an early launch will consist of the large Anchor liner *Tuscania*, which like her sister ship *Transylvania*, recently launched by Scott's Co., Greenock, will be fitted with reducing gear for transmitting efficiently the power from the turbine engines to the propellers.

Messrs. William Simons & Co., Ltd., Renfrew, have of late been more active than ever in adding to the dredging tonnage afloat, as will be noted from their work listed in the Launches and Trial Trips section.

Messrs. William Beardmore & Co., Ltd., Dalmuir, have received from a firm of ship owners in Italy an order for a large passenger steamer.

Messrs. Yarrow & Co., Scotstoun, about end of May launched the torpedo-boat destroyer *Miranda*, and H.M.S. *Landrail*, the fourth torpedo-boat destroyer of the 1912-13 programme, was handed over to the Admiralty on 10th June. H.M.S. *Laverock*, the sister ship which ran ashore near Skelmorlie when on trial, is still on the slip of Messrs. A. and J. Inglis, Pointhouse, undergoing repair.

Messrs. Dunlop, Bremmer & Co., Port Glasgow, who have just completed the steamer *Santa Isabel*, built for the Santa Clara Steamship Co., Liverpool, have secured contracts to build and engine two steamers for foreign owners. These will each be of about 315 ft. length between perpendiculars and will be of a superior cargo-carrying type.

The Greenock and Grangemouth Dock Yard Co., about end of May, received the contract to build, for foreign owners, a large oil-carrying steamer, the machinery for which will be supplied by a Greenock or Glasgow engineering firm.

Motor Ships and Yachts.—The Clyde district continues to take a leading part in the evolution of the motor ship for mercantile purposes. Since last month's notes were penned one twin-screw motor yacht, the *Aroha*, has been launched and tried for speed. This vessel is described elsewhere in our columns. There are orders at present on hand on the Clyde for at least eleven large motor vessels, including three conversions, most of which are due to be completed during the current year. Most of the engines for these vessels are under construction in the works of the Burmeister & Wain (Diesel system) Oil Engine Co., while the vessels themselves are being built at various yards, *e.g.*, Messrs. Barclay, Curle and Co., Ltd., Whiteinch and Elderslie, and Messrs. Harland and Wolff, Ltd., Govan. Speaking at the launch of the Canadian Pacific liner *Missanabie*, from the yard of Messrs. Barclay, Curle & Co., Whiteinch, Mr. Wm. Russell Ferguson, managing director of the firm, said that one of the vessels they had on the stocks was a twin-screw ship of about 8,000 tons gross, which would be fitted with Diesel engines of 6,000 shaft-horse power, made by the Burmeister & Wain (Diesel system) Oil Engine Co., of Glasgow. The vessel was to the order of the Russian East Asiatic Steamship Co., of St. Petersburg, and would be employed in her owners' service between Libau and New York. At present his firm, which was closely associated with the North British Diesel Oil Engine Co., was looking into the designs of a vessel, the machinery for which would be of 36,000 shaft-horse power distributed over three shafts. After the experience his firm had obtained they considered that in a few years it would be just as simple to build a ship having oil engines of 36,000 horse-power as it was at present to build one for steam engines of that power.

Messrs. Hawthorns & Co., Leith, about end of May, received orders from Mr. T. L. Devlin, trawl owner, Newhaven and Granton, for three steam trawlers each 118 ft. in length. The vessels, which are expected to be ready in September and October, are intended for the Faroe fishing, and they will be the largest trawlers belonging to the port of Granton.

Messrs. Davis & Primrose, machine-tool makers, Bangor Road, Leith, have recently completed another very large frame-bevelling machine, electrically operated, and constructed in accordance with the firm's latest patents. This machine is for bevelling the frames of super-Dreadnoughts at one of the Government dockyards. It is capable of dealing with angle sections 3 in. by 3 in. by $\frac{3}{4}$ in. thick, up to 14 in. by 7 in. by $1\frac{1}{4}$ in. thick, giving any desired obtuse angle to the flanges up to 130 deg. and any desired acute angle up to 60 deg. It also operates on channel sections from 6 in. broad by 3 in. deep up to 14 in. broad by $4\frac{1}{2}$ in. deep, and on bulb angle sections up to 14 in. broad by 5 in. deep. Messrs. Davis & Primrose have another machine in progress of equal capacity, but less elaborate, which is the third similar machine ordered from them by Messrs. Harland & Wolff, Ltd., of Belfast and Govan.

Messrs. Hall, Russell & Co., Aberdeen, continue very actively employed in producing steam trawlers, and on one day about the end of May they sent off the stocks as many as four vessels of this class.

Naval Base at Fraserburgh.—The Admiralty, it is announced, have decided to establish a destroyer base at Fraserburgh, which will form part of the general scheme for strengthening our naval position in the North Sea and the establishment of naval bases along the East Coast. Some time during the present month a new harbour basin will be opened and Fraserburgh Harbour, which is one of the best on the whole Scottish East Coast, will then be admirably suited for the purpose of a destroyer base. Vessels of that type will have every facility for entering port at all tides.

THE TYNE AND WEAR.

(From our Own Correspondent.)

The Tyne.

JUNE has been a busy time on the Tyne, though there has not been a great amount of tonnage got off the ways. A fillip has been given to the work on the river by the announcement which came with the close of last month of the success of Palmer's at Jarrow in securing the order for one of the two first-class battleships in the Government's 1914-15 programme. There is an interesting circumstance—or rather coincidence—in the fact that in this jubilee year of the yard at Jarrow they will be building two of the largest battleships of the day—the *Resolution* and the contract just made; thus repeating an experience of twenty-three years ago when they were building at one time two of the largest war vessels of that period—the *Resolution* and the

Revenge. Within the last five years Messrs. Palmer's have built four of the biggest war vessels. The Dreadnought *Hercules*, the cruiser *Queen Mary*, one now on the stocks and one on their books. The latter's keel will soon be laid. Sixty years ago Messrs. Palmer's built the *Terror*, the first armoured vessel they turned out for the Government, and when the yard has completed its jubilee it will have a record list of eighty warships constructed.

Though none of the yards on the Tyne can complain of any slackness there is still considerable keenness over the prospect of new work from the Admiralty, and for the specifications sent out for torpedo destroyers in the 1914-15 programme, most of the builders on the Tyne are tendering, and success will undoubtedly reach some of them. Messrs. Hawthorn, Leslie & Co. and the Jarrow and Hebburn yards are generally favoured in the selection for building these smaller war craft.

At the Elswick yard one of the Norwegian cruisers has been launched, but the *Bjorgvin* will not be ready to take to the water for nearly a month. The boat launched by Madame Vogt, wife of the Norwegian Minister in London, this last month was the *Neideros*. These vessels are of 5,000 tons displacement and are intended for coast defence.

Messrs. Armstrong, Whitworth & Co., at their new shipbuilding yard at Walker, are making great progress with the Dreadnought *Malaya*, which they laid down a few months ago, and they have secured orders for two scouts for the Turkish Navy, these vessels forming part of the new programme of the Turks for equipping an up-to-date Navy. The work is divided between the Elswick firm and Barrow, where the engines are to be built. They also launched the Turkish warship *Sultan Osman I.*, which was originally intended for the Brazilian Government, but was sold to the Turks after competition with the Greeks, the firm booking at that time an order for a still bigger Dreadnought than the *Rio de Janeiro* for the original clients. The *Osman I.* has been taken down river to the new yard where the *Malaya* is being built to complete her equipment. The whole of her guns and mountings have been made at Elswick. Her main armament consists of fourteen 12-in. guns and she has a secondary armament of twenty 6-in. guns. There are to be forty-eight guns altogether and the available broadside will be 12,900 lbs. The armour mountings weigh 5,000 tons, manufactured at the firm's Openshaw works. The engines have been made by Messrs. Vickers at Barrow. The vessel was launched with the greater part of her engines and all her boilers in and funnels and funnel casings erected.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Walker and Wallsend, have just completed an important transfer of shares which gives them an interest in the port of Liverpool and of a yard at Whiteinch. The firm of Messrs. H. & C. Grayson, Ltd., of Liverpool and Birkenhead, is an old one, dating back to 1765, and they have yards of an up-to-date character at Liverpool and Birkenhead capable of dealing with the heaviest kind of repair work. Mr. H. M. Grayson, the principal of the company, is a director in the firm of Messrs. J. T. Eltringham & Sons, Ltd., Willington Quay. One of the important vessels Messrs. Swan, Hunter are completing is a large cable-laying steamer for the Anglo-American Cable Co.

The firm of Messrs. J. T. Eltringham & Sons have their ways full at their new yard at Willington Quay. They are nearing the completion of a large and powerful screw steamer tug and salvage steamer fitted for burning oil fuel. It is intended for work in Mexican waters. They have also nearly ready for sea two large modern type North Sea screw steam trawlers for North Shields owners, and two of a special type for French owners. The latter are combined herring-trawler-drifters fitted with bow rudders. The firm have also on hand several other important vessels, including a self-trimming screw collier of about 1,400 tons deadweight and capable of 10½ knots speed.

Messrs. Readhead & Sons, of South Shields, have secured an order for two large cargo boats for the Moor Line, Newcastle.

Messrs. J. P. Rennoldson & Son, South Shields, have in hand a big tug boat for the Sunderland Towing Co., and they are also building a powerful tug for Messrs. Readhead and Sons, tug owners, Newcastle.

Messrs. William Dobson & Co., Low Walker, are building a cargo steamer for Newcastle owners.

Messrs. Wood, Skinner & Co., of Bill Quay, are engaged on a big cargo vessel.

Messrs. William Hill & Co., Ltd., South Shields, are building a single-screw motor cutter for the Hartlepools Pilotage Commission.

The Wear.

Some months ago I made a comparison between the Tyne and Wear to show that in spite of the overpowering predominance of the Tyne in regard to shipbuilding, the Wear was making very great strides and was increasing its output enormously and also building a very much larger class of vessel. My notes on that point are more than justified by the official returns for the first quarter of the year, which show that whereas on the Tyne there were seventy vessels in course of construction of a tonnage of 319,227, the Wear had the splendid record of fifty-one with a tonnage of 204,086. These figures, when one comes to consider the relative value of the various shipbuilding yards, are, to say the least, very remarkable and they are above all these considerations a wonderful testimony to the rapidity of the building operations on the Wear, which is solely concerned in mercantile work and has not the substantial advantage the Tyne enjoys in generous orders from the Admiralty.

Messrs. Doxford & Sons, Ltd., of Pallion, Sunderland, have now completed their new shops for the making of the Diesel oil engines, for which owners of ships are making an increasing demand. The first engine is finished and will be running on the test bed very soon—about the time this journal goes to press. The Cairn Line, Ltd., of Newcastle, have placed an order with the firm for a cargo steamer of 5,500 tons capacity, to be fitted with turbine-geared engines. They are also building a single deck collier on the Isherwood principle, 450 ft. long, 58 ft. by 30 ft., of a deadweight of 11,000 tons for Messrs. Chambers & Co., of Liverpool. The vessel will be used in the Sydney, Quebec and Montreal trade.

Messrs. S. P. Austin, of Sunderland, have booked an order for a cargo steamer for the Tyne-Tees Shipping Co. for their Continental service.

Messrs. Short, of Sunderland, are engaged in the building of a single-deck collier which is a companion vessel to that which Messrs. Doxford are constructing.

Messrs. Blumers, of Sunderland, will shortly lay the keels for two large cargo boats for the Moor Line, Ltd., Newcastle. These were ordered about the time the contract was given to Messrs. Readhead, of South Shields, for two vessels.

THE TEES AND HARTLEPOOLS.

(From our own Correspondent.)

Whitby.

The Turnbull Steamship Co., Ltd. (Messrs. T. Turnbull and Sons, managers), have sold the S.s. *Fairmead*, 2,245 gross tons, to foreigners, for about £5,500.

Messrs. Smith's Dry Dock Co., South Bank, are dry docking and overhauling a large number of steamers, and amongst the new orders secured by the firm are six drifters all for Smith's Dock Co., Newcastle-on-Tyne, and seven trawlers (five for Grimsby, one for Scarborough and one for Hartlepool owners).

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, have just secured the contract to build a passenger steamer for Messrs. M. Langlands & Son, Glasgow, for their Mersey, Newcastle and East of Scotland service.

Messrs. W. Harkess & Son, Ltd., expect to secure the order for two twin screw barges, about 240 ft. long, 9½ knots speed, that are in the market.

Messrs. Richardsons, Westgarth & Co., Ltd., are reported as likely to secure an order for four sets of triple expansions and boilers of about 350 h.p. Their speciality department is very busy, including Nesdrum boilers.

A new regular service of general cargo steamers is being inaugurated by Messrs. Armstrong, Lord & Co., between the Tyne, Middlesbrough and Nantes.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have quite a large amount of work on hand, and they have recently secured the contract

to build a cargo steamer 385 ft. long and 7,500 tons deadweight on 22'6, for Greek shipowners, through Messrs. Crosby, Kerr and Co., Liverpool. The contract price is said to be £48,500, delivered this year.

Messrs. Richardson, Duck & Co. are fairly busy, but no new orders are reported during the month.

Messrs. R. Ropner & Son, Ltd., have recently secured the contract to build a cargo steamer for Messrs. Constantine, Pickering & Co., Middlesbrough, which will keep them busy for some time to come.

Messrs. Blair & Co., Ltd., have secured the contract to supply the engines and boilers for a cargo steamer to be built by Messrs. Craig, Taylor & Co., also the machinery for the steamer to be built by Messrs. R. Ropner & Sons.

West Hartlepool.

Messrs. Crosby, Magee & Co., on behalf of the North of England Steamship Co., Ltd., have sold the S.s. *Bainbridge*, 1,900 gross tons, to Norwegian shipowners.

Messrs. Furness, Withy & Co., Ltd., have placed an order with Messrs. Earle & Co., Hull, for a large twin-screw meat boat, which firm will also supply the engines and boilers for her. They have sold the s.s. *Swansea Trader*, 480 gross tons, to British shipowners, and are reported as being in the market for a replace steamer.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Harbour Dockyard. No new orders are reported during the month, but they have sufficient work to keep them busy till next Easter.

Messrs. W. Gray & Co., Ltd., are very busy at both the old and new yards in connection with the construction of the new yard on the Tees. Sir William Cresswell Gray has promised £2,000 towards the construction of a garden city for his employés. During the month he has opened and given to the town a sea-water swimming bath near Seaton Carew.

The Central Marine Engine Works of W. Gray & Co., Ltd., have to supply the machinery for all the steamers building at both yards of the firm.

Hartlepool.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Middleton Yard, are very busy, mostly with steamers for the newly formed British Empire Transport Co. They are reported as likely to secure the order for a large meat boat that is in the market.

Messrs. Richardsons, Westgarth & Co., Ltd., have sufficient marine engine contracts on hand to keep them busy till next Easter. They have secured two very large orders for condensing plants. Their turbine and speciality branches are also very full of new work.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull Docks and River Side Quay.—The Docks around Hull have been fairly busy this month with steamers coming with full cargoes from all parts of the world, also many very large steamers with wool cargoes from New Zealand and Australia. The New Zealand Steamship Co.'s *Rakaia* will discharge a large amount of frozen meat, which will be despatched all over the Yorkshire and Durham districts. The owners of this fine steamer have arranged to have a steamer every month, so it is hoped that they will be recouped with a large amount of tonnage to take back on the return voyage to New Zealand. The manufacturers in and about Yorkshire have promised to send their goods by Hull, thus saving on railway freights to London. Hull was fortunate in having the Right Hon. T. McKenzie, High Commissioner and ex-Premier of New Zealand visiting the port recently, and speaking at the luncheon given at the Station Hotel, by the Hull Joint Railway Company, he greatly favoured Hull by reason of its geographical position, as a central port for New Zealand's trade. Mr. Christison, who has spent sixty years in the colonies, also spoke very highly of Hull

River Side Quay.—The River Side Quay is now in full swing, steamers sailing every day from the quay to Rotterdam, carrying a great many tourists. The twin-screw steamer *Duke of Cornwall* is making three voyages per week to Zeebrugge, running in conjunction with the North Eastern Railway Company, and has always plenty of passengers. The R.M.S. *Eskimo* and a number of the Wilson Line steamers depart from the quay for Norway and Sweden.

Hull as an Oil Port.—The s.s. *Turbo*, owned by the Anglo-Saxon Petroleum Company, has discharged 2,400 tons of benzine into the Company's large tanks at Saltend. The jetty goes out into the river 1,500 ft. At the time of writing the *Arca* is expected. Tanks of all sizes are being rapidly erected on this part of the city and it is becoming a recognised port with the Government for oil storage. The North Eastern Railway Company has put down a number of railway sidings for this particular trade, which will evidently greatly increase.

Marine Engineers' Strike.—It appears that all sea-ports will soon have vessels laid up. Hull will not feel it very much, as many of the tramp-steamers are away, but Hull is a port that many of these steamers come to from Buenos Ayres with grain cargoes. These vessels are mostly owned by Bristol Channel and North Country owners. The Humber ports are well picketed by members of the Marine Engineers' Association. It is thought that a universal rate of pay for all ports of the United Kingdom would be much better both from the owner's and engineer's points of view. It is hoped that a settlement will soon be arrived at.

Opening of the New Joint Dock.—At the time of writing the owners of the New Joint Dock are now preparing for the visit of the King and Queen. The Corporation and the North-Eastern Railway Company are putting up decorations, and the city will soon have a grand appearance worthy of the Third Seaport of the United Kingdom. The Royal Visitors arrive by special train about noon, on the 26th June, and are to be welcomed by the Mayor and Corporation at the Station. They will then proceed to the City, where the laying of the Foundation Stones of the Tuberculosis Hospital, Coltingham, and the Secondary School for Girls, Coltingham Road, will be performed. The Royal party will then proceed to the New Joint Dock to declare it open. The whole route from Paragon Station to the Dock will be over three miles. Troops from York, etc., Territorials, Policemen, and time-expired Servicemen will guard the party and route. Their Majesties will depart from the new docks and will spend about two hours from the time of arriving in performing the several ceremonies.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., have been fortunate in securing a very large steamer of 11,000 tons to build for the Wilson Line, and which is to be the largest vessel in the firm's East Indian Trade. She will be fitted throughout by the builders to Corporation Survey and Lloyd's requirements and with all the latest and modern requirements for quick discharging, etc.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, and ship repairers, are well booked up ahead to 1916 with trawlers' engines and boilers. The machine shop is working night and day to compete with the ever-increasing orders, and the branch shop at the Alexandra Dock is kept fully employed with graving dock and repair work, etc.

North-East Coast Engineering Works (Hull), Ltd., have had a fair amount of repair work on the several docks and on the following steamers, s.s. *Clintonia*, s.s. *Norman*, s.s. *Canadia*, s.s. *Taygeta*, the usual run of repairs below and on deck. Tug *Winchester*, new funnel, etc.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, are working at full pressure night and day on orders for trawlers, boilers and machinery. All departments are fully employed and the branch shop at Alexandra Dock is receiving a fair amount of repair work.

Messrs. Stewart & Craig, engineers and ship repairers, are fairly busy with general repair work on the following steamers, the s.s. *Rodney*, s.s. *Marsland*, s.s. *Axel Johnson*, s.s. *Patria*, s.s. *Ronald*. This firm are making alterations in their works, both as regards machinery and buildings, to more satisfactorily cope with their ever-increasing trade.

Messrs. Woodall & Co., engineers, have had general repairs on fifteen steamers, and have also executed a number of orders for forgings for the L.C.C. Tramways and local provincial houses. Orders have been completed for heavy purchase treble blocks and snatch blocks for the Compagnie Euskalduna Bilbao. Orders from Alexandra, Bilboa and other ports for the firms patent Handiblock have been received.

Thos. Tate, engineer and boilermaker, Clarence Engine

Works, has had an excellent month of repair work on many local steamers, graving dock work and opening out boilers and engines for Lloyd's Survey.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, Neptune Engine Works, have had a very busy month with graving dock work and the usual deck and engine repairs, also opening out engines and boilers for Lloyd's Surveys. The moulding shop is kept busy with repeated orders for the firm's patent propellers for home and export trade.

Messrs. The Central Dry Dock and Ship Repairers.—A fair amount of tonnage has passed through the hands of this Company during the month, and they had to engage the public graving docks to assist them to push through some heavy repair work.

Fish Dock and St. Andrew's Dock.—The repair shops around this particular dock are very busy, some with very heavy repairs on different trawlers, and opening out for annual survey for Lloyd's. The North Eastern Railway Company's patent slips are severely taxed with trawlers, sighting bottoms, etc., in fact a number of trawlers have had to proceed to Earle's Shipbuilding Co.'s, Ltd., patent slips to undergo surveys, etc. A singular accident happened recently; the s.t. *Ribble*, outward bound, ran into the swing-bridge and did a great amount of damage to the bridge; while it took a considerable time to put it back into its place, ships not being able to come in or leave the dock. It is said the repairs will take about six weeks.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, have several trawlers fitting out at Hull, and preparing for trial trips. This firm's business is increasing so rapidly that they have bought some acres of land to enlarge their yard.

H. Scarr, shipbuilder, Hessle, is well booked up with orders for light work, and is spending a considerable sum of money in piling the sides of the embankment of the yard.

Messrs. Livingstone & Cooper, Ltd., shipbuilders, Hessle, have been very busy working on their first drifter, *Herring Searcher*. The vessel has been completed and towed to Yarmouth to receive her engine by Messrs. Crabtree, Ltd. The firm is now working on the remaining two drifters for Yarmouth. The second launch will take place on the 4th of July and the third a few days after. Two keels have been laid for Iceland trawlers for local owners, and many enquiries for new trawlers and drifters have been received. The machinery in the yard is electrically driven, and quick delivery of vessels is guaranteed.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton. H.M.S. *Safeguard* was successfully launched on the 24th of last month, and the engines and boilers are ready for lifting aboard. The third cargo boat for The Royal Mail Steam Packet Co. was launched last month and is named *Teign*. The S.Y. *Sayonara*, owner Mr. H. J. Drexel, was on the slip last month, having bilge keels fitted and various alterations in cabin arrangements and also in engine room, carried out. The firm are busy with an order from Messrs. J. Samuel White & Co., of Cowes, for turbine castings.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—The *Almirante Gone*, the fourth of six torpedo boat destroyers ordered by the Chilian Government, was launched on the 25th May, and her sister ship *Almirante Simpson* is preparing for trials. The building of two similar vessels is proceeding. Sundry steam and motor pinnaces have been delivered, and the engine works and shipyard continue busy on various contracts.

Southampton.—On the 17th of last month (in a dense fog) a collision occurred in the Channel between the *Kaiser Wilhelm II.* and the S.S. *Incemore*. Both vessels were brought into Southampton, and at the time of writing the *Kaiser Wilhelm* was in the Trafalgar dry dock undergoing repairs, whilst the *Incemore* had left for Antwerp. The *Incemore* had extensive damage to her bows, which were bent backward, as our photograph shows, whilst the damage to the *Kaiser Wilhelm* is just forward of the third funnel on the starboard side and well below the water line.

The Trafalgar Dock is fully booked at present. The *Vaderland* of the Red Star Line was removed to allow the *Kaiser* to be docked. The *Finland, Rotterdam, Kroonland, La France* and *Lapland* are all due for docking, in addition to the vessels of the American and White Star Lines.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Work is proceeding on H.M. torpedo boat destroyers *Lookout, Meteor* and *Mastiff*. H.M. *Victor* has been delivered and H.M.S. *Lance* completed satisfactory trials last month. The first of the two twin-screw tugs for the Argentine Navy was launched last month; the second vessel will be launched this month. They are to be named *Ona* and *Querandi* respectively. The twin-screw motor yacht *Melita* sailed last month for St. Petersburg. Two T.S. shallow draught steam boats for Russia for the Ministry of Ways and Communications are in frame. Several motor boats have completed trials during the past month, and a number of new orders have been received. A considerable amount of general engineering work has gone through the shops in addition to the machinery for vessels in hand. The repairs department have been very fully occupied on vessels of various types.

THAMES.

(*From our Own Correspondent.*)

Shipping Companies.—Quite the event in this direction recently has been the practical joining up of the two large shipping companies trading to the East, *viz.*, the P. & O. and the British India Line. This movement perhaps accounts for the large rise in P. & O. shares for some time past. The preferred dividends of the two companies have been the same but while that of the P. & O. ordinary has been equivalent to 15 per cent. that of the British India Co. has been 10 per cent. Hence it has not been a difficult matter to effect an exchange of stock, each £100 of British India 5 per cent. prefs. getting a similar amount of new P. & O. and each £50 of British India deferred is to receive £33 6s. 8d. of the new stock. The two companies will still work as separate concerns, but the directors of the concerns will act in a dual capacity. The magnitude of the transactions will be seen by the following statement to put the joint line on a footing as the largest British fleet and not far behind the International Mercantile Marine and the Hamburg-Amerika line.

	P. & O.	British India.
Share capital	£3,500,000 ..	£1,657,200
Debentures	1,800,000 ..	1,909,170
Assets	8,469,689 ..	6,099,952
Tonnage	548,564 tons.	598,203 tons.

Considerable advantages are likely to accrue from the amalgamation, there being through bookings and an interchangeability of tickets, and obviously economies will be possible by the amalgamation. Both concerns are in a very strong financial position and in view of competition the step that has been taken will doubtless be judged to be a wise one. Each company has interests in India and Australia which are more or less identical.

The Royal Mail Co.'s new boat, the *Alcantara*, the latest addition to the fleet, is the finest vessel in the Brazil and River Plate trade. She is nearly 600 ft. long by 67 ft. beam, and has a gross tonnage of 15,800. She has a double bottom extending the whole length of the vessel. The ship is replete with all the latest and up-to-date accommodation.

The Aberdeen Co.'s new liner the *Euripides* has recently arrived in the Thames. She is about 15,000 tons register and is 569 ft. long by 67 ft. beam. She is the second largest liner to dock in the Thames, and there is an entire absence of vibration due to the combination principle of engines. The double bottom extends right fore and aft and there are eleven water-tight bulkheads up to the awning deck. Besides being a large cargo carrier the vessel is designed for carrying 1,350 passengers.

The Eagle Oil Transport Co. have had launched for them on the Wear and Tyne two new vessels, the *San Nazario* and the *San Onofre*. These vessels are of the largest size, over 500 ft. in length and fitted with quadruple-expansion engines. The oil cargoes are carried in twelve holds divided longitudinally into twenty-four compartments and the boilers burn oil fuel.

The Port of London Authority.—This body are issuing £1,000,000 4 per cent. inscribed stock at a price of £96 per

cent. The stock is redeemable on the 1st July, 1960, or at any rate with notice after same date in 1940. In carrying out the big extensions at the Albert Docks many houses in West Ham and Woolwich have been demolished, and to replace them new buildings are being erected on garden city lines. The accounts for the year show a balance of revenue of £1,216,631. After various charges there is a surplus of £191,904. Of this £100,000 is added to reserve and £91,904 carried forward.

Greenwich Pier.—The pier has been extended recently to provide berthing accommodation for large passenger steamers. Among the improvements are shelters giving accommodation for 1,000 people and the occasion of the opening took the form of a ceremony at which the Mayor of Greenwich presided over a considerable gathering.

Thames Training Ships.—This time of year is the one for inspections of the vessels lying in the Thames which train youths for sea service. One of the chief of these is the *Arethusa*, lying off Greenhithe, and here Prince Louis of Battenberg made the inspection with the Princess accompanying him. At the prize day on the *Exmouth* off Grays, the Right Honourable Herbert Samuel was present with a large company of visitors. At the inauguration ceremony of the *Northampton* off the Thames Embankment, Prince Arthur named the vessel in the absence of the Duke of Teck, president of the governing body. A large body of ladies and gentlemen were present to welcome the Prince, who inspected the workshops and expressed approval of all the arrangements on board.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

THE shipping, commercial and social heart of the great Mersey port received a shock which words fail to describe, when the report became verified of the appalling disaster to the Canadian Pacific steamer *Empress of Ireland*. By a strange coincidence the sister vessel was alongside the landing stage during the afternoon, her decks alive with passengers, whilst the fine vessel flying the Blue Peter eagerly awaited the commencement of her voyage to Quebec, herself a "thing of life," shortly to pass over the wide bosom of the majestic St. Lawrence, where her ill-fated sister vessel lay with her mortal wound and her cargo of death. Some 200 homes of members of her crew had by this sudden calamity been plunged into mourning, the scenes outside the Canadian Pacific Railway offices being most pathetic ones which would never be forgotten, scenes which perhaps serve most fully to illustrate the terrible reality of such ever-recurring taking of toll by the sea in human life and suffering. One of the most impressive memorial services ever held in this city took place at St. Peter's Church on June 3rd, when the Bishop of Liverpool, Dr. Chavasse, preached the sermon. Most of the shipping offices closed their doors between noon and two o'clock on the day of the service, at which many distressed relations of those lost were present.

Canadian Pacific Railway.—Pathetic scenes were witnessed in Liverpool upon the arrival of members of the crew and passengers from the *Empress of Ireland*, some of whom arrived by train from Glasgow where they had disembarked from the S.S. *Corsican*, whilst others reached Liverpool by the Allan Liner *Alsatian*, and were met down the river by a tug boat. Sir T. G. Shaughnessy, president of the Canadian Pacific Railway, has authorised the subscription of £10,000 to the fund for the relief of the sufferers in the recent disaster. The liner *Megantic*, whilst passing the sunken *Empress*, stopped her engines, the passengers and crew reverently joining in singing the hymn "Abide with me." The *Teutonic's* ship's company paid a similar tribute to the dead.

Messrs. Cammell, Laird & Co.—The *Vasilefs Constantinos* was launched from the yard of Messrs. Cammell, Laird & Co. on June 9th to the order of Messrs. A. A. Embiricos for the National Steam Navigation Company of Greece. Madame Gennadius, wife of the Hellenic Minister in London, performed the launching ceremony, which was very successful. This vessel, which is the first of two now building by this firm, was referred to in our last issue and is one of the finest vessels in the Greek Mercantile Marine.

The light draught steamer *Devon* was launched by this firm on June 10th for the Royal Mail Steam Packet Co. for the carriage of chilled and frozen meat, and is described elsewhere.

The machinery for the light cruisers *Caroline* and *Cleopatra* is making good progress, whilst in the fitting out basin the P. and O. steamer *Karmala* and the *Cuidad de Buenos Aires* are receiving their machinery. The Canadian train ferry steamer is expected shortly to be ready for trials. The repair department have been kept busy with various classes of work.

Messrs. H. & C. Grayson.—An important fusing of interests has recently taken place between two well-known firms of shipbuilders and engineers. Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Wallsend and Walker-on-Tyne, and Messrs. H. & C. Grayson, Ltd., of Liverpool, have concluded an agreement whereby an exchange of shares is effected. The former firm also effected last year an exchange of shares with Messrs. Barclay, Curle & Co., of Whiteinch, Glasgow, besides which they have a large interest in the Wallsend Slipway and Engineering Co., as also in Messrs. Harris Bros., Ltd., of Swansea. The firm of Messrs. H. & C. Grayson are one of the oldest of their kind in the country, being established in 1765. They own graving docks, slipways and repair works at Liverpool, Garston and Birkenhead. Mr. H. M. Grayson, the principal, is also a director of Messrs. Clover, Clayton & Co., Ltd., R. & H. Green & Silley Weir, Ltd., of London, and Messrs. Jos. T. Eltringham & Co., Ltd., of Willington Quay-on-Tyne, Whilst the management of the business at Liverpool, Wallsend and Whiteinch remains as before, an increased general efficiency and continuity of supervision for owners having work carried out at either coast will be attained.

Colegrave's Boat-Lowering Gear. — We are informed by Messrs. Bullivant that six Admiralty transports are now being fitted with this gear at Southampton as follows:—*Rewa* two sets, *Rohilla* two sets, *Somali* four sets, *Soudan* four sets, *Plassey* three sets and *Dongola* four sets. This gear is being fitted to existing davits; single wire rope falls are used, whilst one man only is required at each davit.

Messrs. Babcock & Wilcox's Patent Boat-Lowering Gear.—At time of writing an interesting model of this gear is being displayed, by means of which large numbers of ship's boats can be launched from either side of a vessel. Mr. E. Speakman, the London representative, is demonstrating this device, which is being fitted to the new steamers now under construction for the Canadian Pacific Railway at the yard of Messrs. Barclay, Curle & Co.

The Cunard Line.—The *Aquitania* left Liverpool on June 20th on her second voyage for New York. During her maiden voyage the liner was stated to have been most steady, the whole of the machinery running perfectly smoothly. Dancing was indulged in as if the vessel had been in harbour.

Special provision has been made on this vessel for carrying no fewer than twelve guns, thus enabling use to be made of her, should occasion arise, by the Naval authorities for transport or other duties.

Severe tests of the two Thornycroft motor boats supplied to the *Aquitania* were carried out in the Crosby Channel before they were finally stored on board. These vessels, which are 30 ft. long, can maintain a speed of 8 knots for twenty hours, and are fitted with a quarter K.W. Marconi wireless installation operated either by belt connection with the main motor or by a hand crank. Messages were sent and received to and from the *Aquitania* and the station at Seaforth.

White Star Line.—The *Majestic*, which was recently sold to Messrs. T. W. Ward, Ltd., of Sheffield, for breaking up purposes, has been placed at their breaking up depot at Morecambe. This vessel was brought from Southampton by Captain Borgg, of Liverpool, and is thrown open to visitors for inspection during the summer months.

Manchester Ship Canal.—A wharf is to be provided at Irlam for the receiving of raw material and despatch of finished products in connection with the Partington Steel & Iron Co. Cargoes of iron ore recently received from Newfoundland and Narvik were unloaded at Manchester, some nine or ten miles away, and then sent by rail to Irlam. This Company are gradually starting fresh departments at their new works on the canal.

Meeting of Shipping Experts.—A meeting of shipping experts from all those Companies interested in the Atlantic steamship trade was held in the Adelphi Hotel, Liverpool,

on June 17th to 19th. A lunch on board the *Aquitania* and visits to Port Sunlight and Eaton Hall were arranged by their hosts, the Cunard Company.

Cadet Ship H.M.S. "Conway."—At their last monthly meeting the committee of management of this well-known training ship of the Mercantile Marine Service Association received and accepted an offer by the Canadian Pacific Railway Co. to provide ten scholarships. These competitive scholarships are to carry as a condition that the cadet joins the Canadian Pacific Railway service on leaving the Conway, or on completion of twelve months' training in the Navy as R.N.R. midshipmen. The chairman, Mr. G. D. Killey, in accepting, stated that there were 170 cadets at present on board, but they were unable to meet all the requests for cadets in the various lines.

Engine-Room Heroes' Memorial.—On May 29th, Sir Wm. Goscombe John submitted to the Finance Committee of the City Council a model of the proposed monument to the engineers of the *Titanic*. The object of the sculptor has been to emphasise the heroic nature of the memorial, the motive chosen being the contending nature of the elements—fire and water. The monument will stand 45 ft. high and will be placed on a site on the Princes Parade.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—Shipbuilding is once more in a state of great activity in all departments at Barrow, by reason of the new orders which have lately come to hand. Some of the initial departments were beginning to slow down, as new orders were slow to come to hand, but when Messrs. Vickers, Ltd., secured the order to build another "Dreadnought" for the Imperial Ottoman Navy, together with other smaller orders, it became evident at once that the great activity known in the shipbuilding trade of the town for some years past would be continued for some further years to come. The new order represents a much bigger ship than the *Reshadieh*, now completing for the Ottoman Government. Her displacement in tons will be 23,000, and her speed with forced draught 21 knots. She will be a quite up-to-date modern warship, and when completed will prove of great value to the Turks in the Mediterranean and the Black Sea. Her main armament will consist of 13·5 in. guns, same as those in the *Reshadieh*, and her secondary armament will consist of 6-in. guns and 12 pounders. She will be equipped with two 56-ft. steam pinnaces, one 45-ft. steam pinnace, one 42-ft. motor launch, two 32-ft. cutters, two 30-ft. cutters, one 30-ft. gig, one 36-ft. sailing pinnace, one 27-ft. whaler, two 18-ft. dinghies, and two 10-ft. Balsa life bolts. The keel of this vessel, which will be named *Fatih*, which means in Turkish, Conqueror, was laid at Barrow on the 11th of June by Lady Calliard, the wife of Sir Vincent Calliard, one of the directors of Vickers Limited. Her ladyship by means of a hydraulic riveter placed a rivet in two of the keel plates which were laid in position on the ways. The work of building the vessel will now be proceeded with, as she is needed to strengthen the Turkish Navy so soon as she can be delivered.

The Reshadieh.—Very great energy is being concentrated in the work of fitting up this "Dreadnought," and a very large number of men are employed on the vessel fitting up her engines and attending to all the other departments which it is necessary to finish before she can go out to sea for her trials. A whole host of Turkish inspectors are employed on the vessel, and the speed with which the work is being done is almost phenomenal. The dispute between Turkey and Greece has created considerable interest in this warship, and it has been stated that she will have to leave Barrow early in July, completed or not. If she goes then she will certainly be far from finished.

The Turkish Floating Dock.—The work of preparing the material for the Turkish Floating Dock, which is to be delivered to a French shipbuilding yard on the Mediterranean at a place named La Seyne, where the dock will be completed and finished, is proceeding apace. It has been arranged to deliver about 1,000 tons of finished material per month to France, and it will thus be seen that the work will have to proceed very quickly if these weights can be got ready. The dock will be built under the auspices of Messrs. Vickers, and one of their men is going to France to look after the construction

The Emperor of India. — Great attention is being paid to the work of finishing this British super-Dreadnought during the course of the present year, and quite a small army of men are working night and day on the vessel in the engineering, electricity, plumbing, painting and other departments. When the *Reshadieh* is out of the way, both vessels lying alongside of each other in the Buccleuch Dock, it will be possible to give more attention to the finishing of this vessel. The British Battleship *Revenge* is receiving considerable attention in the shipbuilding yard, where she is lifting her sides more and more every week. There is, however, a great scarcity of skilled men to do all the work Messrs. Vickers have on hand. Although there is at the moment a demand for fully another thousand workmen in Barrow the Corporation of the town cannot be induced to commence a municipal housing scheme, as they feel if they did so they would perhaps ultimately find the houses empty in periods of trade when shipbuilding was not so busy as it is at present. Then again building material is very dear, and it is impossible to build houses at a cheap price. Thus the disposition of Messrs. Vickers to further develop their already gigantic works is being checked in a way which is simply irritating to all concerned.

The New Airsheds.—The work of building the airsheds on Walney Island which has been undertaken by Messrs. Vickers Limited, is making very great progress. Already one of the very large sheds which are being put up in which to build airships has been roofed in, and there is any amount of accommodation for other sheds to be erected when the demand for aircraft of various classes is more pronounced than it is at present. It is the intention of Messrs. Vickers to make this department a large one, as it is expected the British Navy will require the delivery of quite a large number of airships. The firm are already building large numbers of aeroplanes, sea planes, and all types of aircraft, and the probabilities are that the new department on Walney Island will soon be able to turn out large and small airships on quite a big scale.

Other Work in Hand.—Very great progress is shown in connection with other orders in hand at the Barrow works, and this is made all the more possible by reason of the practical absence of labour difficulties at present. The two light cruisers which are being built for the Navy are gradually lifting their sides on their ways, and before very long one of these vessels, the *Penelope*, will be ready for launching. The oil tank oil-driven steamer, the *Olympic*, building for the Admiralty, is now seen to be a very big ship. Her heavy oil engines are ready for her, and are still undergoing experimental trials. The new section of the Brazilian Floating Dock is being pushed forward, and in the submarine department where there is plenty of orders very great activity prevails.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff.—On 9th July the big Holland-America liner *Statendam* will be launched from the north end of the Queen's Island. The putting of this vessel in the water will be one of the big events of the year in local shipbuilding. During the month of June Messrs. Harland and Wolff completed and sent to sea two notable vessels—the Royal Mail Steam Packet Co.'s *Alcantara* and the Aberdeen liner *Euripides*. The former has a gross tonnage of about 15,700, and the latter about 15,000; both are triple-screw vessels, full particulars of which appear elsewhere. Good progress is being made with the fitting out of the White Star liner *Britannic*, and one of the huge funnels has been placed in position. Lord Pirrie spent some little time in Belfast during the month of June, when he made arrangements for further extensive developments in the yards and engine works. During his visit his lordship entertained the members of the Bulkhead Committee, headed by Sir Archibald Denny, and gave them a practical demonstration of his views on the subject of their enquiry.

Messrs. Workman, Clark & Co. launched a vessel of about 8,500 gross tonnage, named *City of Nagpur*, on 4th June. This vessel is the third ordered from the same builders for the Hall Line branch of the Ellerman Lines, Ltd., the other two being the *City of Vienna* and the *City of Exeter*. Messrs.

Workman, Clark & Co. will shortly launch the twin-screw steamer *Essequibo* for the Royal Mail Steam Packet Co.'s West Indian service. Mr. Hugh M'Millan, who for some years past has held the post of manager of Messrs. Workman, Clark & Co.'s yards, has been appointed manager of the Fairfield Co., with a seat on the Board of Directors, in succession to Mr. Sampson, who has resigned. With the transference of his services Mr. M'Millan goes back to the firm with whom he served his apprenticeship. Before coming to Belfast Mr. M'Millan was for a short time shipyard manager with the Ailsa Shipbuilding Co., Ltd., Troon, and previous to that he was for some considerable while with Messrs. Swan, Hunter & Wigham Richardson.

The Harbour.—The pedestal bases for the Harbour Commissioners' big crane have been completed and parts of the crane are now coming in. It will be a good while yet though before the crane is erected and ready for work. Rapid progress is being made with the various dredging operations in connection with the new fitting-out wharves. The Commissioners have recently erected storage sheds along the quay situated between the entrances to the York and Dufferin Docks.

Londonderry.—The Shipbuilding Co. at this port have another difficulty to contend with in the scarcity of housing accommodation for their workers. When the firm was in negotiations for taking over the yard it was understood that steps would be taken to provide the necessary houses, but up till now little has been done in the required direction. Recently, however, a meeting of citizens alive to the necessity for immediate action was held, at which Mr. Fletcher, secretary of the North of Ireland Shipbuilding Co., pointed out the great disadvantage the Company is suffering from this want of accommodation for their men. Plans and figures are at present before a committee of citizens with a view of floating a Company to build the houses. It is to be hoped that the proposed scheme will come to something, for the shipyard is continually losing employés owing to lack of accommodation for the latter's wives and families, and if matters continue in their present unsatisfactory state there is grave danger of the shipbuilding industry being once more lost to Derry.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff, Barry and Newport.

OWING principally to the intervention of the Whitsuntide holidays the volume of work executed in the ship-repairing establishments of the Bristol Channel ports during the past month fell somewhat below the average. This, of course, is the usual condition of affairs following on a general holiday, and when taken in conjunction with the fact that there was a slight spurt in freights, fully explains the falling off in this particular line of business. However, the impending settlement of the Spanish and Italian strikes, releasing as it will a large amount of tonnage, will act adversely on the ruling freights, and presumably owners will then once more turn their attention to overhauls and surveys which have been delayed till suitable opportunities occur. During this quiet period of trade some of the larger establishments possessing dry docks of their own are in the fortunate position of being engaged practically to their fullest capacity. Some of the smaller concerns, although in the enjoyment of a steady and increasing volume of business, are not in a position to compete on the same level with the larger firms, through not having dry docks of their own. Rumours are afloat at the present time concerning prospective amalgamations in order to overcome the latter difficulty, but nothing definite can be ascertained at present.

Just at the time of writing these notes the commencement of a strike of sea-going engineers has taken place with the object of obtaining increased remuneration, and as there is a working agreement between the Marine Engineers' Association, as representing the sea-going branch, and the Amalgamated Society of Engineers and the Steam Engine Makers' Society, as representing the shore workers, it would seem as if the ship-repairing trade will eventually feel the effects of the strike, especially as it is mainly directed against the "tramp" class of steamers, which, of course, furnish the bulk of the tonnage trading to the Bristol Channel. In view of this particular point, therefore, it is to be hoped that an early settlement may be effected.

Mountstuart Dry Docks, Ltd.—The dry docks of this Company have been engaged without a break for the last month, the exceptional facilities provided for dealing rapidly with large repairs being evidently appreciated by owners of tonnage frequenting the Bristol Channel. Heavy repairs have been effected to the steamers *Margam Abbey* and *Eastlands*, also the *Rio Pirahy*, which had had her decks swept. The *Salento* and *Green Jacket* both had stem and bottom damage. The large Liverpool steamer *Knight of the Garter* was found to have a broken stern frame and damaged plating in way of same. The Glasgow steamer *Astarte* dry-docked recently and was found to be heavily damaged by ice and grounding; in consequence about sixty plates are being dealt with. Amongst other work dealt with were general repairs on the *Strathord*, *Boulama*, *British Monarch*, *Stokesley*, etc. The pneumatic plant recently installed has proved a great success.

Channel Dry Docks and Pontoon Co. and its associated concerns at Barry and Newport continued to be fairly well employed during the month on general repairs. Amongst the steamers dealt with were the following:—*Wallace*, *Principessa Cristina*, *Mitra*, *Uganda*, *Trevalgan*, *Zinovia*, etc.

Messrs. Shearman were kept excellently employed on heavy and general repair work at Cardiff, Barry and Newport. The work executed included bottom damage and rudder damage on the *Cornelia*, and general repairs on the *Queensland Transport*, *White Heather*, *Silvia*, *Izraban*, *Leucadia*, *Etolia*, *Irene*, *Castle Eden*, *Golden Gate*, *Argentine Transport*, *Emlyn*, *Thorpe Grange*, etc.

Messrs. Elliot & Jeffrey were busy on general repair and survey work on the *Camlake*, *Radley*, *Rossall*, *Polmanter*, *Cambank*, *Loppersum*, *Polurrian*, *Haileybury*, etc.

Junction Dry Dock Co. were fairly well engaged on general repairs to the steamers *Southwaite*, *Tintern Abbey*, *Abaris*, etc.

At Barry there was no work of special interest executed, although the volume of general repair and survey work was satisfactory.

The Graving Dock Co. were fairly busy on general repairs to the *Drumcliffe*, *West Wales*, *Rothenhill*, *Cardiff*, *Wearpool*, *Celtic King*, *St. Dunstan*, *Moliere*, *Birkdale*, *Wagner*, *St. Kentigern*, etc.

Messrs. C. H. Bailey were, as usual, actively engaged both at Barry and Newport. Heavy bottom damage repairs were executed on the steamer *Hemisphere*, as well as general repairs on the *Border Knight*, *Waltham*, *Baku Standard*, *Earl of Forfar*, *Alfalfa*, *Wyandotte*, *Carthusian*, *Datetree*, *Commonwealth*, *Thistletor*, *Clinton*, *Burdale*, *Wolverton*, *Charterhouse*, *Tiverton*, *Cliftonian*, *Algeriana*, *Haslingden*, *Mar Negro*, etc. This firm have gained for themselves an enviable reputation for rapidity of despatch, and no doubt this reputation is largely responsible for the vast amount of work entrusted to them for execution.

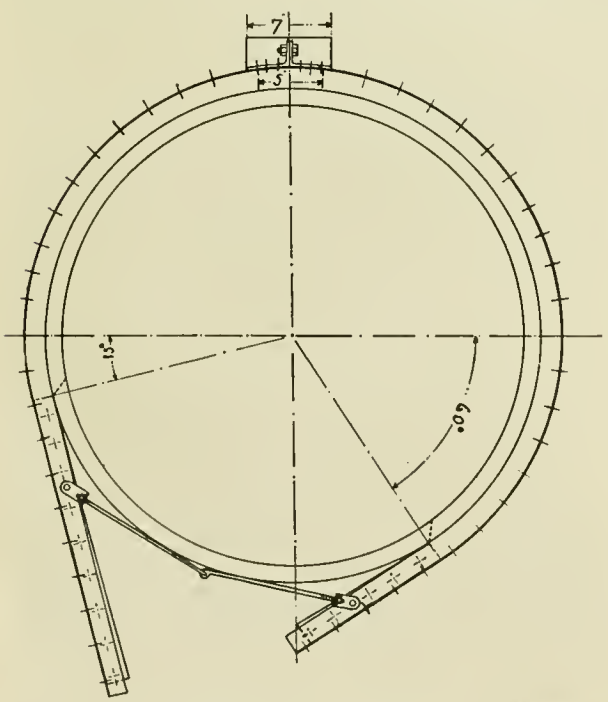
Big Liner at Cardiff.—The triple-screw steamer *Euripides*, the latest addition to the magnificent fleet of the Aberdeen White Star Line, entered the Queen Alexandra Dock during the month to ship 5,000 tons of coal for her maiden voyage from London to Australia. The *Euripides* is the largest liner which has ever entered Cardiff and notwithstanding her great height out of the water it was possible to ship the bunker coal by the tips in the ordinary way. This fact speaks volumes for the magnificent coal-shipping facilities existing at this port, and which will compare favourably with those existing at any other port in the kingdom. The liner came direct from Messrs. Harland & Wolff's yard at Belfast, and during the passage to Cardiff acquitted herself excellently. A prominent feature of her equipment is the arrangement of the lifeboats, smaller boats being placed in position under the larger boats and so secured that they may be cast loose and float off in the event of the ship sinking. A rather unusual point in connection with the lifeboats is the provision of davits of the ordinary type instead of the now more common ones of the quadrant type. No doubt the owners have their reasons for reverting to the older type. Another feature of interest is the provision of an emergency dynamo on the main deck, driven by a Diesel oil engine, for supplying light and power in the event of the steam power being put out of action. A further feature in common with other steamers of the liner class is the provision of two 4·7-in. guns placed in position on each quarter.

PATENT WATER-CIRCULATOR FOR BOILERS.

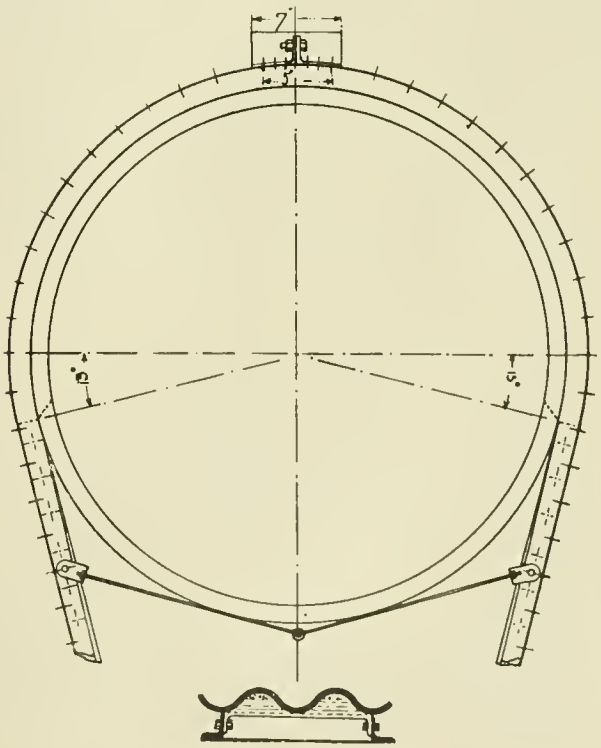
THE importance of a good circulation of the water in the ordinary type of marine boiler, especially when raising steam, either from cold water or from banked fires, is too manifest to require emphasising, but it may be briefly indicated what advantages accrue from efficient circulation, and the disadvantages which arise from defective circulation. Dealing with the latter in the first instance, the time occupied in raising steam is a factor in considering the economical service rendered by a ton of coal, and bad circulation tends to increase the factor against economy. The differences in the temperature of the boiler shells at different positions ought to be the least possible in order to avoid undue strains, brought about by unequal expansion, a prolific cause of leaky seams and landings, with consequent repair bills and general deterioration; defective, or want of circulation is responsible for much of this trouble. The efficient circulation of the water makes for economy in fuel, in time and labour, besides maintaining the normal condition of the boiler, adding to its years of service and keeping down the cost of upkeeps to a minimum. Many expedients have been tried to improve the circulation and give heat to the water below the fires; Messrs. G. & J. Weir introduced means to this end some years ago.

Our attention has been directed to a simple and inexpensive method of inducing circulation, which has been devised and patented by Mr. John Tait, one of the staff of the Union Co., of New Zealand, and who has come from the Dominion in order to develop the patent in this country. Two of the steamers of the Union Co., of New Zealand, have been fitted, and owing to the experience and good results with them it is under consideration to fit the whole fleet. Several smaller steamers were fitted before those of the Union Co. during the experimental and demonstrating period, and satisfactory evidence of improvement in the boilers after the circulators were fitted led to the fitting of the Union Co.'s s.s. *Taviuni* and *Mokoia*. Twelve circulators have also been made for the *Maori*, and as soon as this vessel lays up she will be so fitted. Reference to the illustrations will show the principle on which the Tait Circulator acts, and also the inexpensive nature of the fittings. In the course of raising steam from cold water in the ordinary marine boiler, it is many hours before the bottom of the boiler becomes even warm, that steam is showing on the gauge, and this is undoubtedly detrimental to the whole structure. To cure this defect it is necessary to induce the water below the furnaces to rise rapidly, come into contact with the heating surfaces and pass upwards to the steam space. By means of the plates and angles shown secured on the furnace, the water is enclosed in a case and induced to rise from the lower part to the upper part of the furnace, and, passing rapidly over the heating surface, the currents of water follow on, tending to accelerate circulation. The circulator, composed of light angles and plates bolted together, is clamped to the furnace, and is readily removed for inspection. The width of the case is about 1 ft. and the space about 2 in. from the furnace plate in a plain furnace; or in the corrugated type the width is made to cover two corrugations and the space about 1½ in. clear of the outer diameter of the corrugation. The baffle plate on the top is to prevent sediment falling on the furnace crown and also to direct the flow of water to either side for the up currents. The testimony of those who have tested the circulator in the steamers where it has been fitted and in use for a sufficient length of time show that steam has been raised more quickly, less coal has been consumed, and the temperature of the boilers has been more uniform.

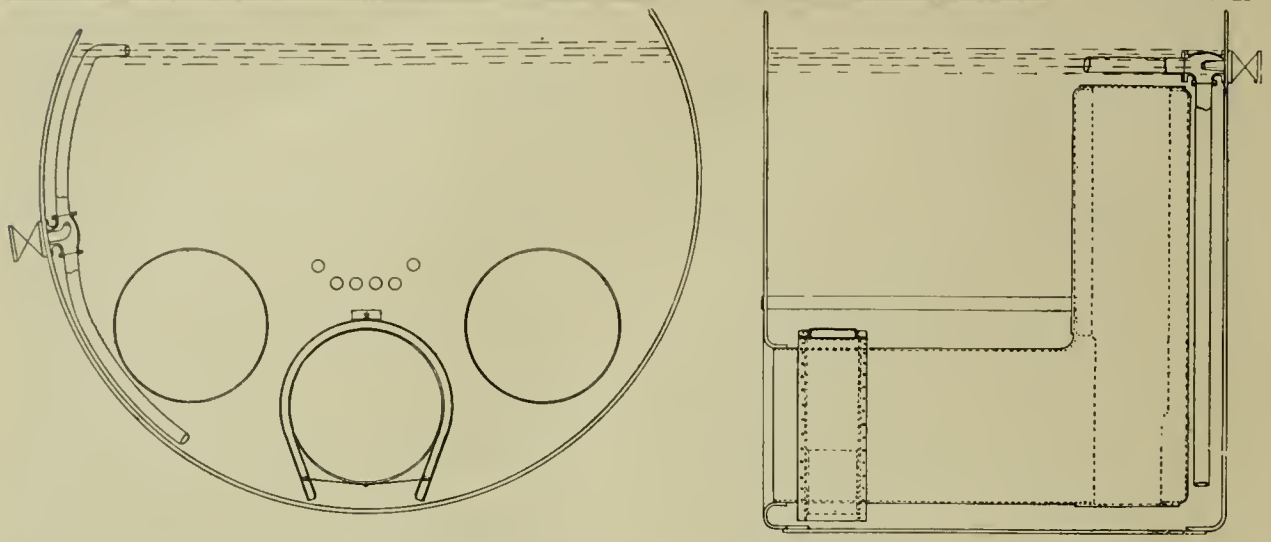
N.B.—As before stated, Mr Tait is at present in this country, but on his return to New Zealand his address will be Tait's Patent Circulator Co., Ltd., Port Chalmers.



Tait s Circulator fitted in the boilers of the *Mokoia* (Union Co. of New Zealand).
One circulator fitted on each of the two lower furnaces.



Tait's Circulator on the *Taviuni*.



Tait's Circulator, as fitted in the Union Co. of New Zealand *Taviuni*. Two circulators are fitted, both on the lower furnace. (The feed water circulator as shown here is not yet fitted on the *Taviuni*, but is under consideration.)

GEIPEL'S "RAPIDITY" STEAM TRAP.

THE Geipel steam trap has now been on the market for a number of years, and large numbers have been sold and are in use in all parts of the world. The manufacturers, Messrs. Wm. Geipel & Co., of Vulcan Works, St. Thomas' Street, London, S.E., inform us that the old type of Geipel trap has been entirely replaced and that the use of the new type, called the "Rapidity" trap, on steamships and Admiralty vessels is rapidly increasing.

Various advantages obtain in the "Rapidity" type over the old style of trap, and these are particularly useful on shipboard. The valve is larger and more substantial. It is held on its seat by the pressure of steam in such a way that no matter what excess of pressure there may be, the expansion parts are not strained. This is important, as in other expansion traps, straining either of the valve or expansion parts, occurs when the pressure rises above that at which the trap is set. The valve is more easily removed, and more easily ground in. It is of the rotating type and tends to grind itself in, at each blow-through.

There is a hand and foot blow-through, and for Admiralty purposes there is an automatic regulation, by which means the trap will work within ranges of full pressure, say, of 300 lbs. or more down to atmosphere, without adjustment.

Geipel steam traps are in use on over 100 Admiralty vessels, and many of the most recent vessels of the mercantile marine use the trap. It is interesting to note that on the latest Cunarder *Aquitania* there are about forty of them in use.

AUSTRIAN SHIPBUILDING.—Three small passenger steamers were launched or delivered last month from Austrian yards, *viz.*, the *San Giorgio* for the "Istria Trieste," and built by the Cantiere San Marco, launched on the 11th of June. The vessel is 160 ft. in length, 24 ft. beam and 12 ft. 6 in. depth. She will carry two classes of passengers and has saloons and promenade. Electric light is installed and the vessel will be steam heated. Triple-expansion engines by the builders will give the vessel a speed of 14 knots. The t.s.s. *Grado*, built by the Cantiere San Rocco, for the same society of "Istria Trieste," ran trials on 30th of May. The vessel is in length 135 ft., beam 20 ft., and depth 9 ft. 6 in. She is intended for shallow waters, and will be propelled by two Diesel motors at a speed of about 11½ knots. The *Monfalcone*, a cargo and passenger coasting steamer of 136 ft. length, 20 ft. 6 in. beam and draught 10 ft., built by the Cantiere Navale Triestino for the Monfalconese Steamship Society, ran trials on 11th of June. The propelling machinery is a triple-expansion engine by Messrs. Mackie & Baxter, Govan, of 500 h.p., which will give the vessel a speed of 12 knots.

REVIEWS.

The China Clippers. By Basil Lubbock. Glasgow: James Brown & Son. Price 5/-.

MR. Basil Lubbock, the well-known nautical writer, has given us a very interesting book in "The China Clippers." The book deals with the history of the celebrated clipper ships in the Chinese opium and tea trades, and gives detailed accounts taken from the logs of ships or from their captains and officers, of the great tea races, which in the fifties and sixties roused the interest of the maritime world. The book is opened with an account of the Chinese opium trade and the swift sailing craft engaged in this hazardous but lucrative business, and follows on with a number of chapters relating to the American clippers and describing the struggle which took place between these craft and British clippers for supremacy. The book comprises 420 pages and contains a large number of illustrations, many of which have been collected with great difficulty owing to their scarcity. An illustration of *Cutty Sark*, built at Dumbarton in 1869, a clipper famous for her turn of speed, is reproduced on the cover of the book.

Engine-Room Practice. By John G. Liversidge. London: Charles Griffin & Co., Ltd. Price 6/- nett.

THE edition under notice is the eighth of a very useful publication, and the succession of editions which the book enjoys speaks volumes for the reception it meets with from the engineering public. The present edition has over 400 pages with six plates and 113 other illustrations. Besides a general revision of the matter, some very useful notes have been introduced on the subject of steam turbines and the whole subject of the book has been brought up to date and carefully revised.

Steam Turbines. By James Ambrose Moyer. London: Chapman & Hall, Ltd. Price 15/- net.

THE first edition of this work was published in 1908 and the general object was to give in a small volume the result of years of practical experience, the knowledge which engineers and students of engineering are anxious to know with reference to steam turbines. The present work is a second edition, which has been revised and enlarged, but scientific investigation has not added much to previous knowledge of the properties of steam nor have the new types invented in the interval become commercially successful. Again, all the additions made in the edition under review are mainly in the line of new applications of the turbine principles, and the chapter on low pressure turbines has been rewritten to include the latest applications.

Practical Iron Founding. By J. G. Horner. London: Whittaker & Co. Price 5/- nett.

THIS is the fourth edition of a work which was written with

the view of giving a condensed account of principles and practice of iron founding which would have utility for the student as well as the practical man. Since the first edition was published great changes have been made in the founding of iron and the advances made have necessitated a considerable enlargement of the work as well as the rewriting of certain portions of it, notably those relating to machine moulding. It will be found that the present edition is double the size of the previous ones. In addition to the new chapters introduced, a number of examples of moulding have been included. The work is divided into sixteen chapters, with an appendix comprising fifteen tables dealing with various matters, such as Sand Mixtures, Particulars of Cupolas, Blowers and Fans, Crane Chains and Ropes, Composition of Cast Iron, Mensuration, Weights of various Metals and of Cast-iron Cylinders, Comparative Weights, Weights of Cast-iron Balls, Decimal Equivalents and Decimal Approximations. The work now presents itself as something more than an elementary treatise and consequently has a much higher value than any of the previous editions and is of such a character as to merit the appreciation of those who would acquire an apprehensive work on the subject.

MESSRS. RONALD TRIST & CO., LTD.—The pre-eminent and interesting firm of Messrs. Ronald Trist & Co., Ltd., who have achieved a large measure of success with the S.E.A. ring packings, their thermofeed system of control and other useful devices, are extending their operations, to do which, the capital of the Company is being increased to £20,000, and they are moving into a large suite of offices specially designed for them in the same building as they are in at present, and in addition, new works are being equipped at Watford in order to cope with the increased orders due to the large extension of business. It is interesting to record that they have just added to their staff such well-known figures in the engineering and advertising worlds as Messrs. G. A. Goodwin, M.I.C.E., W. H. Taylor, A.M.I.Mech.E., J. A. Donachie, M.A., M.E.E., M.I.E.E., D. A. Sheret, A.M.I.Mech.E., C. S. Wolfe, C. Coenen, Robt. L. Hadfield.

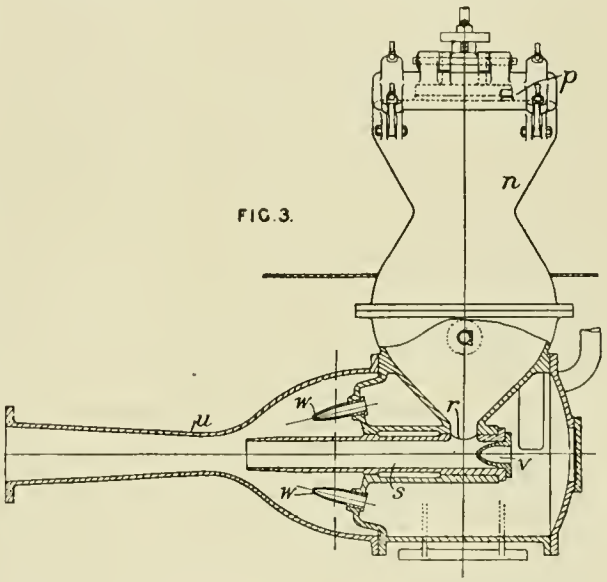
Bow of s.s. *Incemore* after collision with s.s. *Kaiser Wilhelm II.*, June 17th. (See "South of England Notes" and "Fleets.")

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

3176. Discharging Ashes from Ships. Ash-ejectors for ships comprise a hopper from which the ashes are discharged into a stream of low-pressure water, the discharge being assisted by a jet of high-pressure water supplied through a nozzle at the lower end of the hopper. Ashes are supplied to the hopper *n* through the cover *p* and gravitate through the opening *r* into the pipe *s*. A nozzle *v* supplies water

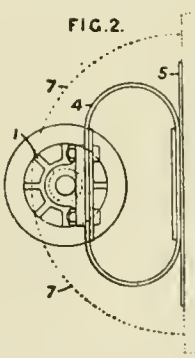
FIG. 3.



under pressure to force the ashes into the discharge pipe *u* through which flows a large volume of low-pressure water at a low velocity. The delivery end of the pipe *s* is arranged co-axially with the pipe *u*, and the ashes are carried by the stream in the pipe *u* to the external water. Auxiliary nozzles *w* may be fitted to assist the flow of water in the pipe *u*, or the water may be circulated by a pump.

4234. Fenders for Boats, To protect ships' lifeboats during lowering operations, anti-friction rollers are arranged on the sides of the boats so as to rotate on a horizontal

FIG. 2.



axis. The rollers 1 are directly mounted upon coach-spring brackets 4 secured to the side of the boat 5. The rollers are used in combination with ordinary fenders 7, which absorb the shock after a certain depression of the springs.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on Tyne.

ABELIA. Launch, June 5th. This cargo twin-screw motor vessel is the third of large size completed in this country. It has been built to the order of the Flower Motor Ship Co., Ltd. (managers, Messrs. M. Samuel & Co., London.) She will carry about 5,600 tons deadweight at Lloyd's summer freeboard. As in the case of the sister ship *Arum*, which is now at sea on her first voyage, twin motors are of the cycle type and the pumping arrangements are very complete. She has complete gear for handling cargo, including eight 6 in. by 10 in. and one 7 in. by 10 in. steam winches. Oil fuel is carried in all double bottom tanks right fore and aft, and also in fore and after peaks with special pumping arrangements. Dimensions :—Length between perpendiculars, 350 ft. ; breadth moulded, 46 ft. 9 in., and depth moulded, 27 ft. This vessel is being built to Lloyd's highest class on the Isherwood longitudinal principle and has Suez Canal certificate. A special feature is the unusual height of 'tween decks and the large hatchways available for the pilgrim traffic and military transport. The motor engines are by the Wallsend Slipway and Engineering Co., of Wallsend-on-Tyne, and are of direct-acting, reversible two-cycle type, with scavenging and air compressors. The combined engines will develop fully 1,200 b.h.p. at 135 revolutions per minute. Two boilers of ample power, working at a pressure of 100 lbs. per square in., with not less than 500 square ft. of heating surface to each boiler, are being fitted in the vessel for supplying steam for deck machinery, steering gear and electric light, and will burn either coal or liquid fuel. Cochran (Annan) donkey boilers fitted with liquid fuel appliances on the Wallsend-Howden system have been installed.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Walker-on-Tyne.

ARAGAZ. Trial Trip, May 25th. The steel screw petroleum steamer *Aragaz*, built at the Walker Shipyard for the Aragaz Tank Steamship Co., Ltd., of London, was taken to sea. A mean speed of 11½ knots was attained. Dimensions :—Length overall, 400 ft. ; breadth, 50 ft. 3 in. ; depth moulded, 30 ft. 3 in. The deadweight is 7,200 tons on a moderate draught of water. The chart-room, wheel house and Marconi room are placed on the bridge deck, with a flying bridge above. The liquid cargo will be carried in eight double tanks. The space between the forward cofferdam and fore peak will be arranged as a cargo hold. The vessel is built to Lloyd's 100 A1 class under special survey. The machinery is of the triple-expansion type, manufactured by the North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne, and has cylinders 25½ in., 42 in., 70 in. by 48 in. stroke, steam being supplied by two steel boilers working at 180 lbs. pressure under Howden's system of forced draught. After the trial the vessel returned to the Tyne for bunkers, prior to sailing under the command of Captain Reid.

SAN ONOFRE. Launch, June 10th. Large tank steamer, built for the Eagle Oil Transport Co., Ltd., of London. Dimensions :—Length overall, 548 ft. ; length between perpendiculars, 530 ft. ; breadth extreme, 66½ ft. ; depth moulded, 41½ ft. to shelter deck. Propelling machinery of the quadruple-expansion type will be provided. The cylinders are 28½ in., 41 in., 58 in. and 84 in., with a stroke of 54 in. Steam will be supplied by four cylindrical boilers designed for a working pressure of 220 lbs., and arrangements are made for burning liquid fuel. The vessel has been built to Lloyd's highest class on the Isherwood system of longitudinal framing, and has a complete shelter deck. The oil is carried in twelve holds, which are divided longitudinally by an oil-tight bulkhead and separated from the remainder of the vessel by cofferdams. Fuel oil for the boilers is carried in a large cross bunker aft, a deep tank forward and at the sides of the main expansion trunk. A large towing winch is fitted aft for towing ocean-going oil barges. The oil-pumping installations in these vessels are the largest ever fitted on oil-carrying steamers, and are specially adopted for dealing with heavy oil. Messrs. Wailes, Dove & Co.'s "Bitumastic" solution has been applied throughout the ballast tanks, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

S. P. Austin & Son, Ltd., Sunderland.

LADOGA. Launch, May 23rd. Steel screw steamer built to the order of Messrs. Wm. Thomson & Co., of Leith, for Baltic and general trades. Dimensions :—Length overall, 285 ft. 2 in. ; breadth extreme, 40 ft. ; depth moulded, 21 ft. 6 in. The machinery, together with a large marine type donkey boiler, will be supplied by the North-Eastern Marine Engineering Co., Ltd., from their Sunderland works. The vessel is of the single-deck type with poop, bridge and forecastle. The vessel will be classed 100 A1 Lloyd's, with scantlings in excess of the rules, and the bows are additionally strengthened for ice.

Bartram & Sons, Sunderland.

BENRINNES. Launch, June 10th. Steamer, built to the order of Messrs. William Thomson & Co., Leith. Dimensions :—Length, 424 ft. ; breadth, 51 ft. 6 in. ; depth, 29 ft. 7 in. moulded. She has been built under special survey to take the highest class in Lloyd's Registry. Special attention has been given to the coal bunker capacity for the Eastern trade in which the vessel will run, and they are carefully arranged for easy loading and trimming. The engines have cylinders 26 in., 43 in. and 72 in. by 48 in. stroke, supplied with steam by three boilers 15 ft. 6 in. by 11 ft. 6 in., working at 190 lb. pressure. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels have been applied throughout the bilges.

Wm. Doxford & Sons, Ltd., Sunderland.

SAN NAZARIO. Launch, June 9th. Built to the order of the Eagle Oil Transport Co., and designed specially for the Mexican oil trade. She will carry 15,600 tons, and has a length of 540 ft., a breadth of 66½ ft., a depth of 34 ft., and a draught of 26 ft. She is built on the Isherwood system to Lloyd's highest class. The oil will be carried in twelve holds, divided longitudinally into twenty-four compartments and separated from the remainder of the vessel by coffer dams. The supplies of oil fuel for the boilers will be carried in a large cross bunker aft, a deep tank forward and at the sides of the main expansion trunk. The pumping machinery has a capacity of 1,200 tons per hour.

AZTEC. Trial Trip, June 12th. Trials were run on the measured mile at Whitley Bay, and a speed of 11·5 knots attained. The ship was loaded down to her marks. The vessel is unique, being the first of a new type of tank steamer specially constructed for expeditiously handling the heaviest grades of oil. A feature of interest to owners of bulk oil carrying vessels is the scientific construction of the oil compartments. The holds of the vessel are sub-divided by twelve semi-circular bulkheads which form six large tanks above the cellular bottom. These bulkheads are free from stiffeners, gussets and stays, being connected to the deck and tank top by a double riveted foundation angle connection. The inside of each compartment thus formed is therefore free from all obstructions and can be readily cleaned. Added to this there are no riveted stiffeners and stays to work loose, and therefore the bulkhead repair bills (a very heavy item, as owners know to their cost) will be reduced to a minimum, the circular form of tank being the strongest possible receptacle to carry any liquid. The oil-tight surfaces can be inspected at any time, and can be kept constantly under observation. It is claimed that heavy and viscous oils can more readily be handled, as the cylindrical tanks are free from the cooling action of the sea water, which considerably reduces the temperature to which the oil can be raised, so that less steam is required to heat the oil in the cylinders, with a consequent saving in coal. The vessel carries the full deadweight of oil in the cylinders, having stowage at 40 square ft., whereas if it is required to carry light oils the summer tanks or spaces outside the cylinders have ample capacity for the lightest oils. A large tank running fore and aft provides for expansion of the oil or for varying densities. Other parts of the vessel are up-to-date in every detail, and in accordance with the highest and latest improvements for carrying oil in bulk. Two separate pump rooms are fitted amidships, each having a large cargo oil pump and oil pipe line capable of discharging the whole cargo in twenty-four hours. The vessel and machinery have been constructed under the supervision of Messrs. Jack & Muers, of 32, Great St. Helens, London (who are representatives of the patentees).

J. T. Eltringham & Co., Ltd., Willington Quay-on-Tyne.

ALEX. HASTIE. Launch, May 28th. Steam screw trawler of modern North Sea type, the second of two duplicate vessels building by Messrs. Eltringham to the order of Messrs. R. Hastie & Sons, North Shields. This is the third vessel to be launched from their new premises at Willington Quay, and is the fourteenth trawler launched for account of Messrs. Hastie.

JOHN DONOVAN AND HERCULES. Screw trawler and screw tug respectively. The first two vessels from the new yard at Willington Quay-on-Tyne. The screw trawler *John Donovan* was the first launched, which is the first of two duplicate vessels building to the order of Messrs. R. Hastie and Sons, North Shields. The second was the tug *Hercules*, building to the order of the Mexican Eagle Oil Co.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne.

PORT ALBANY. Trial Trip, May 26th. Passenger and cargo steamer, built to the order of Messrs. William Milburn & Co. (Commonwealth and Dominion Line, Ltd., London). A highly successful trial trip off the Tyne was run on this date. For Launch, see March issue.

Osbourne, Graham & Co., Sunderland.

PENSACOLA. Launch, May 27th. Steel screw steamer *Pensacola*, constructed to the order of Messrs. Furness, Withy & Co., of West Hartlepool, for their Pomeron ore and Pensacola pitch-pine trade. Dimensions :—290 ft. long by 40 ft. 1½ in. by 18 ft. 9 in. moulded, with an arch of 6 in., constructed on the Swan & Hunter-Maxwell Ballard arch principle, and carrying about 3,400 tons on a light draught to Lloyd's highest class. Engines, designed to drive the vessel at a high rate of speed, will be supplied by Messrs. Richardsons, Westgarth & Co., Sunderland.

GRAZIELLA. Trial Trip, May 19th. Steel screw steamer, specially constructed to the order of Messrs. Fearnley & Eger, of Kristiania. During the trial everything was quite satisfactory to all concerned, the contract speed being exceeded. A Cochran (Annan) donkey boiler, fitted with patent seamless furnace, has been supplied. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, and their patent "Bitumastic" covering to the tank tops. For Launch, see May issue.

Palmers' Shipbuilding & Iron Co., Hebburn.

MARICOPA. Trial Trip, May 28th. This large Norwegian oil-carrying steamer attracted considerable attention as she left the Tyne on her trial speeds. She carries 10,000 tons. The owners, Messrs. Wilhelmsen, of Tonsberg, have just had constructed the *San Joaquim* and the *La Tabra* on the Wear, and have now in conrse of construction a fourth 10,000 tonner, the *Belbridge*, also for the oil industry. It is understood that Messrs. Wilhelmsen & Co. have opened with a Californian oil company an important charter for something like ten years to run all four boats between California and Chile. For Launch, see June issue.

CITY OF MYSORE. Launch, June 9th. Steel screw steamer built to the order of the Ellerman Lines, Ltd. The vessel is about 416 ft. long, and will carry a deadweight of about 8,700 tons ; she is to be classed 100 A1 at Lloyd's, and has cruiser stern and two complete decks, with poop, bridge and forecastle ; water ballast is carried in the cellular double bottom all fore and aft, also in deep tank adjacent to after engine-room bulkhead ; she has six large cargo hatches to holds and 'tween decks ; side girders and built pillars are fitted to give clear space for shipping heavy cargoes ; accommodation with saloon is provided in large deck house at fore end of bridge deck, with captain's and chart-room in house above ; the engineers' accommodation is in the house built around the aft end of engine casing on the bridge deck ; the petty officers, etc., are in the aft end of the bridge. Marconi house for wireless telegraphy is fitted on the bridge deck ; special attention has been given to the derrick arrangement, for the quick handling of the cargo, and the vessel has thirteen steam winches. The vessel is to be fitted by Palmers' Company with triple-expansion surface-condensing engines of 48 in. stroke, there being two large main boilers and one auxiliary boiler, all designed for a working pressure of 220 lbs.

Wm. Pickersgill & Sons, Ltd., Sunderland.

KELBERGEN. Launch, May 23rd. Built to the order of Messrs. The N. V. Furness Scheepvaart en Agentuur Maatschappij, Rotterdam, and under special survey to take the British Corporation's highest class as a single-deck steamer. Dimensions :—Length, 391 ft. ; breadth, 52 ft. 3 in. ; depth, 29 ft. 6 in., with a cargo-carrying capacity of about 8,200 tons. She is fitted with cellular double bottom throughout for water ballast and the peaks are also fitted as ballast tanks. She is being built with a special view to rapid loading and discharging of cargo, and is fitted with five large hatches, each of which is worked by double derricks fitted on mast tables, with outriggers at mast head, and full complement of derrick posts. The vessel is to be rigged as a two-masted schooner with steel lower masts and wood telescopic topmasts, the lower masts being specially strengthened to take 25-ton lifts. Ten powerful steam winches are being supplied and a special quick-warping windlass of the latest type. The steam-steering gear is fitted in house amidships abaft engine-room and controlled by rods and bevelled wheels from flying bridge. A Jackson's automatic brake is fitted on tiller aft. The vessel is specially arranged with a view to carrying large deck cargoes in accordance with the requirements of the Dutch Government. The machinery and boilers are being supplied by Messrs. Richardsons, Westgarth & Co., Ltd., of Sunderland, the cylinders being 25 in., 40 in. and 68 in., with a stroke of 48 in., and steam will be supplied by three large multitubular boilers built of steel, with a working pressure of 180 lbs.

John Readhead & Sons, Ltd., South Shields.

LINKMOOR. Trial Trip, May 22nd. Screw steamer, built to the order of the Moor Line, Ltd. (Messrs. Walter Runciman & Co., managers), Newcastle-on-Tyne. The vessel is fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., with 48 in. stroke, steam being obtained from two large steel boilers of 180 lbs. working pressure. After satisfactory trials she proceeded to Dunston to load for the Mediterranean under the command of Captain Bruhn. For Launch, see May issue.

TREWELLARD. Launch, May 28th. Steel screw steamer, built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall. Dimensions :—382 ft. by 51 ft. 6 in. by 26 ft. 8½ in. The vessel will carry a deadweight cargo of over 7,800 tons on a light draught of water. She is of the complete shelter-deck type to Lloyd's highest class and under their special survey, and has large clear holds fitted with shifting boards, etc., for grain cargoes, with a full equipment of steam winches and derricks for rapid handling of cargo. A large quantity of water ballast is carried in double bottom and peak tank. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in., 69 in. with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch.

Charles Rennoldson & Co., Lawe Shipyard, South Shields.

CAMEL THREE. Launch, May 27th. On this date the first vessel completed by this firm was launched. The vessel, which is the first of two duplicate orders, has been built for the Mersey Docks and Harbour Board, and is to be used for salvage purposes in the Mersey. The steamer is a very fine example of strength of construction. The design is peculiar. Her dimensions are 112 ft. by 30 ft., and 12 ft. deep, and for 66 ft. in the midship length there are two separate hulls divided by a space of about 3 ft. Through this well the wire ropes come up which have been passed under a wreck. On the deck are bollards of enormous strength to take the strain off the great steel hawsers. She is divided into nineteen water-tight compartments, and is fitted with a steam boiler to supply two very powerful deck winches. The machinery has been supplied and fitted by a North-east Coast firm.

Swan, Hunter & Wigham Richardson, Ltd., Neptune Works, Newcastle-on-Tyne.

MACCLESFIELD. Launch, May 22nd. Steamer built for the Great Central Railway Co.'s service between Grimsby and Rotterdam. The vessel is built of steel, 250 ft. in length by 34 ft. beam, and will carry about 1,100 tons of cargo on a light draught of water. She will carry cargo and horses, and will also have accommodation for a limited number of passengers in a long house amidships. The auxiliary machinery includes steam windlass, steam winches

and steam-steering gear aft connected by means of a telemotor to a hand wheel on the bridge, and electric light is fitted throughout. The propelling machinery consists of a set of triple-expansion engines, supplied with steam by two large boilers. Both engines and boilers are being constructed at the Neptune Works, and are expected to drive the vessel at a speed of 13 knots when fully loaded. This vessel is a duplicate of the *Chesterfield*, completed last year at the Neptune Works for the Great Central Railway, and which boat is now running very successfully on the Grimsby-Rotterdam route. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers and open bottom under boilers.

VARSOVA. Launch, June 9th. The second of three similar twin-screw steamers which are being built and engined there to the order of the British India Steam Navigation Co., Ltd., of London, for that Company's service between India and the Persian Gulf. The steamer is 390 ft. in length by 53 ft. beam by 26½ ft. depth, and is being constructed to attain the highest class in Lloyd's Register. She is a sister ship to the *Varela*, lately completed at the Neptune Works, and has accommodation for thirty-two first-class passengers in state-rooms on the promenade and shade decks, with lounge and smoking room on the promenade deck and a handsome dining-room on the shade deck. The second-class passengers, twenty-four in number, have their dining saloon on the upper deck and state-rooms on the shade deck. In addition a large number of native passengers will be carried on the upper deck. The propelling machinery will consist of twin-screw triple-expansion engines supplied by steam from six boilers working under Howden's forced draught, both engines and boilers being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd. The auxiliary machinery on deck includes eight steam winches, steam-warping winch, steam-steering gear, steam capstan, steam windlass, electric light and ventilation, wireless telegraphy, refrigerating machinery, etc.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne.

VAN HOGENDORP. Trial Trip, May 14th. Steel screw steamship. A series of runs was made on the measured mile just north of the mouth of the river Tyne. Everything worked without a hitch, and the very satisfactory speed of 14 knots an hour was attained. After the speed trials were completed the vessel sailed for Rotterdam. For Launch, see April issue.

MONGARA. Trial Trip, May 22nd. Twin-screw steamer, built to the order of the British India Steam Navigation Co., Ltd., was taken out to sea and most successfully completed a long and exhaustive trial trip off the mouth of the river Tyne. During the trial trip the engines and boilers worked without a hitch and to the satisfaction of everybody concerned. A speed of 14½ knots per hour was attained on the measured mile, and under service conditions only a quarter of a knot less was maintained during a twelve hours' continuous run. These speeds were easily got and are considerably in excess of contract requirements. For Launch, see March issue.

VARELA. Trial Trip, May 28th. Twin-screw steamer, to the order of the British India Steam Navigation Co., Ltd., of London, went for a successful trial trip on this date. On the trial trip the machinery worked without hitch, driving the vessel at a speed of about 16 knots per hour and giving satisfaction to all concerned. For Launch, see May issue.

Swan, Hunter & Wigham Richardson, Ltd., Southwick-on-Wear.

ADMIRALTY FLOATING CAISSON. Launch, June 8th. Building for one of H.M. graving docks at Portsmouth. It is different in design from the sliding caisson launched last summer for Portsmouth dockyard. It was built and launched on its side owing to its large draught of water. After launching the caisson was towed to wet dock at Sunderland, where it was uprighted and completed for towing to Portsmouth.

R. Thompson & Sons, Ltd., Sunderland.

KONGSFOS. Trial Trip, June 12th. The trial was very successful, the engines working splendidly, a mean speed of 10½ knots being easily attained, and Mr. Burnett, on behalf of the owner, expressed entire satisfaction with both vessel and machinery. After the trial the vessel proceeded to Sundsvall under the command of Captain S. Terjesen. For Launch, see June issue.

The Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne.

GARDENIA. Launch, May 23rd. A steel screw steamer built to the order of the Stag Line, Ltd., of North Shields, Messrs. Joseph Robinson & Sons, managers. The vessel is built to class B.S.* at British Corporation Register with single deck laid and the dimensions are—Length overall, 342 ft.; breadth extreme, 48 ft.; depth moulded, 24 ft. 6 in., having poop, bridge and topgallant forecastle, and is designed to carry over 5,300 tons on a light draught. A large quantity of water ballast is carried all fore and aft in six tanks on the cellular double bottom principle, also in fore and after peaks. The vessel is constructed on the deep frame principle with five steel bulkheads, giving exceptionally clear holds, with large hatchways for the carriage of bulky cargoes, and also has wood shifting boards throughout to meet the requirements of the Grain Cargo's Act. Special attention has been given to the quick discharge of cargo. Steam heating is fitted to the bridge accommodation for captain, officers and engineers. The sanitary, lighting and ventilating arrangements are effected on the latest improved principle to meet the British Board of Trade requirements. The machinery is being supplied and fitted by Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne.

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Stockton-on-Tees.

MELANIA. Trial Trip, May 28th. During the whole of the trial everything worked with the greatest smoothness, and over a series of runs the vessel maintained a speed of over 11½ knots fully loaded. The remarkable freedom from all vibration when the vessel was going full speed and manœuvring was specially commented upon and appreciated, and the trial was eminently satisfactory in every way. The vessel has been built to the order of The Anglo-Saxon Petroleum Co., Ltd., London, and is similar to the oil-tank steamer *Winamac*. For Launch, see May issue.

Wm. Gray & Co., Ltd., West Hartlepool.

CITY OF RANGOON. Trial Trip, June 12th. The performance of the ship and machinery on trial trip was entirely satisfactory, an average speed of 14 knots being attained. For Launch, see May issue.

Harkess & Son, Ltd., Middlesbrough.

FALERNIAN. Launch, May 25th. Screw steamer, built to the order of the Ellerman Lines, Ltd., Liverpool. Dimensions:—318 ft. by 42 ft. 5 in. by 26 ft. 9½ in., and the vessel will carry over 5,000 tons deadweight. She is constructed with the builders' latest type cruiser stern, which adds considerably to the cubic capacity and strength of the poop. The vessel will take Lloyd's highest class under special survey, and is built to a very full specification, and has also accommodation for a number of passengers in a large steel house on the bridge deck. Her machinery is by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough, and consists of engines 20½ in., 35¾ in., 60 in. by 42 in. stroke, and three boilers of very high pressure.

Irvine's Shipbuilding & Engineering Co., West Hartlepool.

PANAMA TRANSPORT. Trial Trip, June 4th. Throughout the trials of this vessel the engines and all auxiliaries worked very satisfactorily, a speed of 12 knots being attained, and she afterwards proceeded to the Tyne. For Launch, see June issue.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

TAMAHA. Trial Trip, June 12th. Steel screw tank steamer, built to the order of the Tank Storage and Carriage Co., Ltd., of London, proceeded to sea for her official trials. The trials passed off successfully and the vessel returned to Middlesbrough, whence she will sail under the command of Captain S. Hollinshead. For Launch, see June issue.

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

ANGLESEA. Launch, June 10th. Steel screw steamer. Dimensions:—Length overall, about 413 ft.; breadth extreme, 52 ft.; depth moulded to shelter deck, 35 ft., with

a deadweight carrying capacity of about 8,000 tons. Built to the order of Messrs. Jenkin Bros., of Cardiff, and will class 100 A1 in Lloyd's Register under special survey. She has two complete decks, *viz.*, shelter and upper decks, height between decks being 8 ft. There are five extra large hatchways to expedite loading and discharging. The vessel is fitted with a steel bulwark amidships from fore end of saloon house to after end of engineers' side houses. A steel bulwark is also fitted from abaft fore end of fore hatch to stem. A cellular double bottom is fitted throughout for water ballast, also peak tanks. Vessel's equipment includes large horizontal multitubular donkey boiler, ten steam winches, winch condenser with circulating pump, derrick tables and crosstrees on masts, two derrick posts, ten derricks, steam windlass with quick-warping ends, steam-steering gear, stockless anchors, fresh-water condenser, and a good inventory and outfit. The vessel is also fitted with an electric light installation, the dynamo having sufficient power for wireless telegraphy. The engines are by Messrs. Blair & Co., Ltd., having cylinders 26 in., 43 in., 71 in. by 48 in. stroke, steam being supplied by three extra large single-ended boilers having a working pressure of 180 lbs.

Ropner & Sons, Ltd., Stockton-on-Tees.

DEMETERTON. Trial Trip, May 26th. This steamer, built to the order of Messrs. R. Chapman & Son, Newcastle-on-Tyne, made her official trial trip in the Tees Bay, when she maintained a high rate of speed. After a satisfactory trial trip the vessel steamed round to the Tyne. For Launch, see May issue.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

LORD DENMAN. Launch, May 26th. Steel screw trawler. Dimensions :—136 ft. 8 in. by 23 ft. 9 in. by 13 ft. moulded. Built to the order of The Yorkshire Steam Fishing Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., Hull.

WALPOLE AND CROUPIER. Launch, June 9th. Two steel screw trawlers. Dimensions :—135 ft. by 23 ft. 6 in. by 13 ft. 1 in. moulded. Built to the order of Messrs. W. S. Letten, G. S. Letten and E. C. Grant, and the Anchor Steam Fishing Co., Ltd., of Grimsby. Each vessel will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Livingstone & Cooper, Ltd., Hessle.

HERRING SEARCHER. Launch, May 28th. This new firm launched on the above date a splendidly-modelled drifter 98 ft. 9 in. by 18 ft. 6 in. by 9 ft. 9 in. moulded. The vessel is built of steel, exceeding Lloyd's requirements, to the order of Messrs. Salmon & Co., of Great Yarmouth. The work on other two drifters is proceeding, and they will be launched in due course. After the launch the vessel was berthed alongside the builders' yard to finish fitting out. The party adjourned to the builders' offices where breakfast was served, and the usual toasts were given and responded to. The party consisted of Coun. Livingstone, chairman of the Company, Mr. H. A. Livingstone, managing director, and Mr. Stokedale, yard manager. Mr. Reid represented the owners.

NORTH-WEST OF ENGLAND.

Cammell, Laird & Co., Birkenhead.

VASILEFS CONSTANTINO. Launch, June 9th. The first of two steamers building for the National Steam Navigation Co., of Greece, for passenger and emigrant service to the United States. The vessel has a length of 500 ft. and a speed of 18 knots. It has accommodation for 560 first and second-class passengers and 1,800 emigrants. A Cochran (Annan) donkey boiler, fitted with patent seamless furnace, has been supplied.

DEVON. Launch, June 10th. Light draught steamer for the Royal Mail Steam Packet Co. The vessel was named the *Devon*, and is very similar to the steamships *Dart* and *Doon*, built for the same Company by Messrs. Cammell, Laird, which have been operating on the River Plate with great success for the last year or so. She is specially designed for the service of conveying chilled and frozen meat from the ranches on the upper reaches of the river to the ocean-going steamers engaged in the chilled meat trade. The dimensions are 220 ft. by 42 ft. by 12 ft. 7 in., and she has been constructed to meet Lloyd's highest requirements for this class of vessel. She is built of steel, with continuous main deck and long upper deck, with double bottom under holds. Her speed will be about 10 knots. She will be schooner-rigged with two masts, and will be fitted with special appliances for rapidly dealing with her cargo of meat. The refrigerating plant consists of a compound horizontal duplex marine type refrigerating machine of the ammonia compression type, fitted with compound steel cylinders, driving two double-acting ammonia compressors. The brine is cooled by two evaporators of the usual marine type, and is circulated by direct-acting duplex steam brine pumps. An independent steam surface condenser is provided, and a separate duplex water circulating pump. There are four large insulated holds, having a total net hanging capacity of 45,000 cubic feet, heavily insulated with granulated cork, enclosed with double thicknesses of lining, with waterproof paper between, fitted with a complete system of runner rails with switches at ends, so arranged that when the meat is placed on a runner hook it can be shifted from one part of the vessel to another on the same level, with the minimum amount of handling. The main propelling machinery consists of two sets of direct-acting triple-expansion engines, with cylinders 13½ in., 21 in. and 34 in. diameter by 19 in. stroke, designed for running at about 175 revolutions per minute. The main condenser is of the contraflo design, the shell being of galvanized mild steel, and the doors and water ends of cast iron. The whole of the shafting in connection with the machinery is supplied by Messrs. Cammell, Laird's own works at Sheffield. The propellers are four-bladed, made of bronze. The propelling machinery is fitted with an installation of auxiliary machinery of the most modern type, including independent air pump and independent circulating pump. A pair of Weir's main feed pumps are fitted, and the installation also includes an auxiliary feed pump, general service pump, and bilge and ballast pump. The boiler installation consists of two single-ended boilers 12 ft. diameter and 10 ft. 3 in. long, the boilers being fitted with Howden's system of forced draught, the forced draught fans being supplied by Messrs. Howden. The whole of the machinery has been constructed to the requirements of Lloyd's Register.

SOUTH OF ENGLAND.

George Philip & Sons, Ltd., Dartmouth.

HAIMARA. Launch, June 4th. Twin-screw passenger steamer, building to the order of the Crown Agents for the Colonies. The vessel and her machinery have been designed by and are being built under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. The vessel is building for passenger ferry service in British Guiana, the principal dimensions being :—Length b.p., 100 ft. ; beam moulded, 23 ft. ; depth moulded, 9 ft. The hull of the vessel is sub-divided by four steel water-tight bulkheads, the compartments consisting of fore and aft peak tanks, fore and main holds, and engine and boiler space. The whole of the accommodation for passengers, officers and crew is arranged above the main deck so as to admit of good ventilation for the tropical climate in which the vessel is to work. Accommodation for seventy-five first-class day passengers is provided on the main deck and fifteen first-class passengers on a roomy upper deck, where a dining saloon is arranged, with bar and pantry adjoining, special provision having been made for thorough ventilation. Two sets of compound surface-condensing engines are arranged in a roomy engine-room amidships, being supplied with steam at 140 lbs. pressure by a large single-ended horizontal return tube marine type boiler. Especially large independent air and circulating pumps are provided, also independent feed and general service donkey pumps. Steam windlass is to be fitted on the topgallant forecastle, steam steering is to be fitted and the vessel is to be lighted throughout with electricity.

ARAWANA. Trial Trip, June 6th. Twin-screw passenger steamer, built to the order of the Crown Agents for

the Colonies, has been successfully tried at sea, when the guaranteed speed was attained. For Launch, see June issue.

John I. Thornycroft & Co., Ltd., Southampton.

ONA. Launch, May 28th. Twin-screw ocean-going tug for the Argentine Navy. The vessel is one of two of a very powerful type and her dimensions are :—Length, 130 ft. ; breadth, 23 ft., and depth, 13 ft. 11 in., with a draught of 12 ft. 6 in. The tug has been built to Lloyd's highest class for towing purposes. An important part of her service will be the towage of battleships of the Argentine Navy. Two sets of triple-expansion surface condensing engines are fitted, giving a total of 1,200 i.h.p. at 130 revolutions. The cylinders are 13½ in., 22 in. and 35 in. with a stroke of 27 in. Steam is supplied by two single-ended boilers. The second vessel, which will be named *Querandi*, will be launched shortly.

SCOTLAND.

Ailsa Shipbuilding Co., Troon.

GLEN USK. Trial Trip. Paddle passenger steamer, built for Messrs. P. & A. Campbell, Bristol. The trials on the Clyde were satisfactory in every respect, the speed attained on the measured mile being 17¼ knots. For Launch, see May issue.

Ailsa Shipbuilding Co., Ayr.

MAPLE. Trial Trip, May 23rd. Satisfactory trials were run of this vessel, built for the Laird Line. For Launch, see April issue.

Ardrossan Shipbuilding & Dry Dock Co., Ardrossan.

SPORTSMAN. Launch. Steel screw steamer, built for Messrs. George Elsmie & Son, Aberdeen. The vessel has been constructed to the requirements of Lloyd's 100 A1 class, and will be engaged in the general coasting trade of her owners. She is 175 ft. long, 27 ft. broad, and 12 ft. 6 in. deep. The machinery, which is by Mr. W. V. V. Lidgerwood, Coatbridge, consists of a set of triple-expansion engines, having cylinders 13½ in., 22 in. and 36 in. in diameter and a stroke of 24 in. She has a topgallant forecastle, bridge, and long raised quarterdeck, and three pole masts. Water ballast will be provided in the double bottom and fore and aft-peak tanks. She is also fitted with the latest gear for the rapid and efficient handling of cargo. The contract has been carried out under Mr. A. M. Gordon, naval architect, Glasgow.

STARBEAM. Launch, June 11th. Steel screw steamer built to the order of Messrs. Elsmie & Son, Aberdeen. The *Starbeam* is a sister ship to the *Sportsman*, built for the same owners, and launched two weeks previously.

ROBINA. Trial Trip. Passenger pleasure steamer, built to the order of the Morecambe Central Pier Co., has arrived at Morecambe from Ardrossan. The *Robina* steams 14 knots, and behaved splendidly on her trial trips on the Clyde. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, also to the flat of bottom, etc. For Launch, see June issue.

Barclay, Curle & Co., Scotstoun.

BAMORA. Trial Trip. On the trials recently completed successfully, a speed of 13 knots was obtained. The vessel is similar to four already constructed for the Persian Gulf trade of the Company and to two others of the same class which are being built at present. The accommodation for passengers is entirely modern, and the cellular double bottom holds about 700 tons of water ballast. There is an installation of separate ranges of pipes for the carriage of fresh water. The propelling machinery, supplied by the builders, is of the triple-expansion direct-acting surface condensing type, with cylinders 20 in., 34 in. and 58 in. in diameter respectively, with a stroke of 45 in. Steam is supplied from four single-ended boilers working at 215 lbs. pressure. For Launch, see May issue.

Wm. Beardmore & Co., Dalmuir.

LENNOX. Trial Trip, May 22nd. Torpedo-boat destroyer, built and engined by this firm for the British Admiralty, ran her full-power trial on the Clyde. The *Lennox* is the second of two destroyers of the L class provided for in the 1912-13 programme. She is fitted with Parsons' latest type of impulse reaction turbines driving twin screws. There are four boilers of the Yarrow small water-tube type, designed to burn oil fuel only, and arranged in two watertight compartments. During the trials the machinery worked very smoothly, and a speed of over 31 knots was attained. This, on a draught of 9 ft., was considered highly satisfactory. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamel has been applied throughout the double bottom.

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

ROYE. Launch. This steamer, the second of two vessels for the Lancashire and Yorkshire Railway Co., has been launched. Dimensions :—240 ft. length, 34 ft. breadth, 16 ft. 4 in. depth moulded, and of 1,000 tons gross. She is built to Lloyd's highest class, and will trade between Goole and the Continent. The builders will supply the engines.

Dunlop, Bremner & Co., Port Glasgow.

SANTA ISABEL. Launch. Single-screw steamer, recently launched for the Santa Clara Steamship Co., Liverpool. The vessel, which is of 2,020 tons gross, is 290 ft. in length, 42 ft. in breadth, and 21 ft. 6 in. in depth. Triple-expansion engines, with cylinders 21 in., 35 in. and 57 in. in diameter and a stroke of 36 in., will be supplied by the builders.

John Fullerton & Co., Paisley.

CHILDWALL. Launch, May 26th. Steel screw steamer, about 720 tons deadweight, built to the order of the West Lancashire Steamship Co., Ltd., Liverpool (Messrs. Alfred Rowland & Co.), and is the third steamer lately supplied to that firm. Engines of 650 i.h.p. are being supplied by Ross & Duncan, Govan.

Alex. Hall & Co., Aberdeen.

ERIC STROUD. Launch, June 6th. Screw trawler, built to the order of Captain Horace Edward Stroud. The vessel is 115 ft. in length, 22 ft. 6 in. in breadth, and 13 ft. in depth. Triple-expansion engines of 450 i.h.p. will be fitted by the builders.

Hall, Russell & Co., Aberdeen.

TRAWLERS. Launch. Four trawlers for the Strath Line Aberdeen Steam Trawling Co. These vessels will take the highest class in Lloyd's Register, and their dimensions are :—Length, 115 ft. ; breadth, 22 ft., and depth, 13 ft.

William Hamilton & Co., Ltd., Port Glasgow.

BAWEAN. Launch, June 9th. Steel screw cargo steamer, built to the order of the Stoomvaart Maatschappij "Nederland," being the last of three steamers recently built by Messrs. Hamilton for this firm. Dimensions :—Length, 435 ft. ; breadth, 54 ft. 6 in. ; depth, 36 ft. 6 in. to shelter deck ; deadweight, 9,750 tons. She is fitted with all the latest appliances for the rapid handling of specially heavy cargoes, including a large number of steel tubular derricks and sixteen powerful steam winches. The vessel will be fitted with machinery by Messrs. David Rowan & Co., of Glasgow, consisting of triple-expansion engines, having cylinders 27½ in., 45 in. and 75 in. by 51 in. stroke, four single-ended marine boilers 15 ft. diameter by 11 ft. 6 in. Howden's forced draught and having a working pressure of 180 lbs. The vessel is classed with Lloyd's Registry for their highest class longitudinal framing (Isherwood system).

Harland & Wolff, Ltd., Govan.

ALCANTARA. Trial Trip, May 29th. This vessel left Belfast for Southampton on this date. The directors of the Royal Mail Steam Packet Co. invited a large party to Southampton to take part in a preliminary run of this new steamer in the Solent. The vessel, which is the largest and latest addition to the fleet of the Company, was built at Govan by Messrs. Harland & Wolff. She is of 15,700 tons gross and 580 ft. in length. She has been built expressly for the South American trade, and started on her maiden voyage on the 21st of June. For Launch, see December, 1913, issue.

Hawthorn & Co., Leith.

IFE. Trial Trip, May 28th. Motor coaster, built for Messrs. Elder, Dempster & Co., Ltd., carried out successful trials on the Firth of Forth. The *Ife* is a sister ship to the *Ila*, completed lately by the Leith firm. The vessel is engined with Bolinders motors and on trials carried out over the measured mile, a speed of 8·3 knots was attained. See April and May issues.

Herd & Mackenzie, Findochty.

ENTERPRISING. Launch, May 15th. Fishing steamer, built for Messrs. G. Smith & Sons, Buckie. The vessel was towed to Buckie prior to going to Inverness to have triple-expansion engines fitted in by the Rose Street Foundry Co. She is 88 ft. in length, 19 ft. in breadth, and 9 ft. in depth.

Archd. McMillan & Son, Ltd., Dumbarton.

NESTOS. Launch, May 21st. Steamer built to the order of the National Steam Navigation Co., Ltd., of Greece, Athens. The vessel is of the single deck type with complete shelter deck. Dimensions :—Length, 399 ft.; breadth, 52 ft.; depth moulded to shelter deck, 32 ft. 10 in. The machinery will be supplied by Messrs. David Rowan and Co., Glasgow. Both vessel and machinery have been built under the special survey of the British Corporation for their highest class.

Ramage & Ferguson, Leith.

CHAKDARA. Launch, May 8th. Steamer, built for the British India Steam Navigation Co. The vessel is one of two of the same class fleet, and is intended for her owners' Eastern trade. Dimensions :—Length, 330 ft.; beam, 46 ft.; depth, 24 ft. 6 in.; tonnage, about 3,100 gross. She is built of steel under Lloyd's special survey for their highest class, and will have a Board of Trade passenger certificate. Accommodation is provided amidships for first-class passengers in two-berth rooms and for second-class passengers in three-berth rooms, with first-class dining saloon and sitting room at the fore end of the bridge and second-class saloon under the aft end of the bridge. Provision is made in the 'tween decks for carrying a large number of native passengers. The vessel will be propelled by single-screw triple-expansion engines, supplied with steam by four large single-ended boilers working at 215 lbs. pressure.

Ritchie, Graham & Milne, Glasgow.

CAMPOS SALLES. Trial Trip. Twin-screw floating crane barge launched in January, for Brazil owners, completed trials on the Gareloch. The contract speed was easily attained, and everything was found to be satisfactory. The vessel is of 450 tons gross, and is fitted with two sets of compound surface-condensing engines by Messrs. Campbell and Calderwood, Paisley, a complete installation for divers to Admiralty requirements, a salvage pumping set and electric light. The crane is by Sir William Arrol & Co., and can deal with lifts up to 30 tons. The vessel is provided with complete accommodation for officers and crew, and will proceed to Brazil under her own steam after being boarded up for the voyage.

Robertson & Co., Sandbank, Argyleshire.

AROLIA. Launch. Twin-screw motor yacht of 50 tons, for Mr. George F. Paisley, Glasgow. Dimensions :—64 ft. 6 in. in length, 14 ft. 6 in. in breadth, 8 ft. 6 in. moulded depth. She is fitted with twin-screw Gardner engines. The framing is of oak, mahogany planking, and she is finished inside in polished mahogany. The forecastle forward has accommodation for four men. There is also the saloon, and, abaft the engine-room, three single state-rooms, a commodious ladies' cabin and a sail locker. She carries a 14-ft. motor dinghy with a Day engine. The yacht attained a speed of 10 knots on the measured mile.

Russell & Co., Port Glasgow.

VIMEIRA. Launched recently. Cargo steamer of 5,850 tons gross, built for Glasgow owners. The vessel, which is constructed to Lloyd's highest class, is 423 ft. 6in. in length, 56 ft. in breadth, and 31 ft. 3in. in depth (moulded). Messrs. John G. Kincaid & Co., Greenock, will supply the machinery. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels were applied throughout the engine and boiler-room tanks, deep tank, bunkers, after peak, etc., and their patent "Bitumastic" covering to tank tops.

Scott's Shipbuilding & Engineering Co., Greenock.

TRANSYLVANIA. Launch, May 23rd. Passenger steamer, built to the order of the Cunard Steamship Co. for the Cunard and Anchor Lines' service between Mediterranean ports and the United States. Dimensions :—Length, 567 ft.; breadth, 66 ft. 6 in.; depth, 45 ft. Accommodation will be provided for about 2,475 passengers of three classes—350 first-class, 125 second-class, and about 2,000 third-class. The first-class public rooms are situated on the promenade deck, and consist of a waiting-room, a lounge, smoking room, gymnasium and garden lounge. On the bridge and shelter deck amidships are first and second-class state-rooms, which are large and handsomely furnished. On the shelter deck at the after end of the bridge are the smoking room and the drawing-room for second-class passengers. The first and second-class dining saloons are situated in the shelter 'tween decks, and extend the full width of the ship. The machinery is a specially interesting feature of the vessel, as it is the first installation of geared turbines to be fitted in a large trans-Atlantic liner. The vessel will be propelled by twin screws, each driven by turbines of the Parsons type working through reduction gearing. The gear wheels are about 10 ft. in diameter, and 5 ft. broad, and are each driven by two turbines working in a series and running at about 1,500 r.p.m. An astern turbine of the impulse reaction type is incorporated with each low-pressure ahead turbine. The arrangements are such that either the high-pressure or low-pressure turbine can be used independently. Thus the derangement of one turbine will not prevent the vessel proceeding on twin screws. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamels have been applied throughout the bunkers, double bottom, bilges in engine and boiler spaces and their patent "Bitumastic" covering to the tank tops.

MUNWOOD. Trial Trip, June 11th. Trials were run on the Firth of Clyde by this steamer, built for the New York to Cuba trade of Messrs. Clark & Service, Glasgow. For Launch, see June issue.

Scott & Son, Bowling.

LINDA BLANCHE. Launch. Screw steamer built for the Anglesey Shipping Co., Bangor. Dimensions :—Length, 170 ft.; breadth, 27 ft.; depth, 12 ft. 6 in. The engines will be supplied by Messrs. Aitchison, Blair, Clydebank.

Wm. Simons & Co., Ltd., Renfrew.

HOPPER DREDGER. Launch, June 8th. A 700-ton hopper steamer launched complete with all machinery on board, and with steam up ready for trials, constructed to the order of the Russian Government. The vessel is propelled by compound surface-condensing marine engines, supplied with steam from a mild steel horizontal multitubular boiler constructed for a working pressure of 120 lbs. per sqnare inch. Powerful steam gear is provided for rapidly raising and closing hopper doors. The vessel has been built under the survey of Bureau Veritas for classification in their registry.

DREDGER. This Company has just completed and despatched to Penang for the Tongkah Harbour Tin Dredging Co. a large and powerful dredger for working in alluvial tin deposits, being the fourth dredger of this class constructed by Messrs. Simons for the Company within recent years. The buckets are of the built type of strong design, the cutting lips being formed of special hard steel. The bucket ladder is constructed in the most modern form of girder work and designed for dredging to a depth of 55 ft. under water level. The upper and lower tumblers are of cast steel with special hard steel renewable bearing bars; the lower tumbler in two pieces is designed to work in special bearings of cast steel and chilled iron. The buckets will discharge the material into shoots lined with steel bars, and thence into the screen. The screen will be of the revolving type with graduated perforations and driven by friction gear at upper end. A set of horizontal compound-condensing engines fitted with air and feed pump are installed to drive the dredging gear. The dredger is fitted with Bluck's patent drop chute. Steam is supplied from locomotive type steel boilers constructed for a working pressure of 150 lbs. per square in. Independent auxiliary steam feed and bilge pump with connections to tanks, water boat and bilges are to be provided. Feed filter, meter and special vertical steam feed heater are also fitted. The dredging gear consists of spur gear with large and powerful friction clutch, so that the buckets can be disconnected at will, while the screen gear may be kept running; the screen gear is driven direct from the engine. Water is supplied to the screen by one 16-in. centrifugal pump driven by vertical compound engines. The pipe from water pump will enter the screen at lower end and will be perforated for its full length. The saving tables are very large and are of an area suitable for the special material to be dealt with.

In addition to the tables special launders are fitted on each side of the dredger. These launders will be provided with riffles for their entire length, so that no paying material may be lost. The launders will also serve the double purpose of carrying off the tailings from the tables sufficiently far astern that even the soft material will not run back upon the buckets. A large and powerful mooring winch driven by an independent two-cylinder high-speed engine is fitted on deck. It has six independent wire-rope barrels, one for head moorings and four for side moorings, and one emergency barrel. All the barrels are arranged to work independently or conjointly. The ladder hoisting gear is also driven by an independent two-cylinder high-speed engine. Large tanks are fitted up on board for feed water, and storage space for a large amount of wood fuel. A special feature of this vessel, as with the others, is that all working parts were carefully made to gauge, and duplicate parts made for templates, so as to be entirely interchangeable. The hull is of steel with steel decks throughout, fitted with beltings at water line, and of special strong construction to meet the various strains due to this class of work. All framing carrying the gearing, bucket ladder, screen and tables, is of steel built in single web section, to facilitate inspection and painting.

T. B. TAYLOR. Launch, June 12th. The barge-loading bucket dredger *T. B. Taylor*, built to the order of the Dundee Harbour Trust. The vessel, which has been specially designed for the work at Dundee, is very well equipped for dealing with all classes of material and is capable of dredging to a depth of 45 ft. below water level. A set of compound marine type engines supplied by steam from multitubular steel boilers constructed for a working pressure of 120 lbs. per square inch, drives the dredging machinery, the gearing wheels of which are all machine cut. Suitable clutches are provided so that the engines may be engaged with or disengaged from the dredging gear or the propelling gear as required. The engines are arranged to give two speeds of buckets so that a constant piston speed is maintained when the dredger is working, either in soft or hard ground. The deck machinery includes steam gear for raising and lowering the bucket ladder; powerful bow and stern winches for manœuvring purposes, and for regulating the cut of the dredger while at work. Comfortable cabins are provided for the officers and crew. The dredger is built to Lloyd's survey. It is not without interest to add that the first dredger constructed by Messrs. Wm. Simons & Co., Ltd., for the Dundee Harbour Trust was built in 1871, and is still in active service and doing good work.

Yarrow & Co., Ltd., Scotstoun.

H.M.S. LANDRAIL. June 10th. This vessel, the fourth torpedo-boat destroyer of the 1912-1913 programme, was handed over to the British Admiralty on the above date. This vessel, which is 260 ft. long and 27 ft. 6 in. beam, is propelled by turbines, the steam being supplied by three of Messrs. Yarrow's latest type of water-tube boilers, fitted with feed heating and superheating arrangements, by which a considerable economy of fuel is obtained.

H.M.S. MIRANDA. Launch, June 11th. Torpedo-boat destroyer to the order of the British Admiralty. This vessel, 260 ft. long by 25 ft. 7 in. beam, is one of the three special torpedo-boat destroyers ordered from Messrs. Yarrow and Co., Ltd., of their own design, contract speed 35 knots, and is fitted with Messrs. Yarrow's latest type of water-tube boilers and superheaters, by which a considerable economy of fuel is obtained. It is interesting to note that *H.M.S. Miranda* is the first vessel to be launched of the 1913-1914 programme known as the "M" class.

IRELAND.

Harland & Wolff, Ltd., Belfast.

EURIPIDES. Trial Trip, June 6th. Triple-screw steamer, built for Messrs. Geo. Thompson & Co., Aberdeen-Australian passenger and cargo service. After satisfactory trials were run, the vessel proceeded to Cardiff for coaling. A number of guests boarded the vessel at Cardiff on invitation of Messrs. Geo. Thompson & Co. and came round on her to Tilbury. She left Cardiff on June 13th. During the run up Channel the vessel steamed at 17·8 knots, her ordinary service speed being 13·5 knots. The *Euripides* will leave the Thames for her maiden voyage to Australia *via* the Cape on July 1st. Captain A. H. H. G. Douglas, R.N.R., commands her. The vessel has two sets of reciprocating engines driving the wing propellers and low-pressure turbine driving the centre propeller, this combination having proved most successful from the point of view of economy in working and the absence of vibration, thus enhancing the comfort of the passengers. For Launch, see March issue.

North of Ireland Shipbuilding Co., Ltd., Londonderry.

SAN FRANCISCO. Trial Trip. Steamer, built for the Isthmian Steamship Co., Ltd., of London, has recently carried out her steam trials with satisfaction to all concerned. The propelling machinery is of an unusually powerful character, and during the progressive trials in Lough Foyle, and run off the Donegal coast, the machinery worked with exceptional smoothness and a speed of just over 14 knots was maintained with a full head of steam. For Launch, see March issue.

Workman, Clark & Co., Ltd., Belfast.

CITY OF EXETER. Trial Trip, June 4th. Twin-screw steamer, built for the City Line Fleet of the Ellerman Lines, Ltd. The machinery tests and speed trials were carried out with most satisfactory results, the vessel afterwards proceeding to Glasgow to load part cargo, thence to go to Liverpool to complete cargo and take passengers for the maiden voyage to India. For Launch, see May issue.

CITY OF NAGPUR. Launch, June 11th. Screw steamer, built for the Hall Line branch of the Ellerman Lines, Ltd. She is 478 ft. in length, with a gross tonnage of about 8,500, and has been built under the special survey of the British Corporation of Shipping for their highest class, and to the requirements of the British Board of Trade. In designing the vessel careful attention has been given to the arrangement of the passenger accommodation with special regard to the requirements of the Indian passenger service, and the vessel fully maintains the high standard of comfort which is a recognised feature of the Hall Line steamers. The cargo space is divided into six large holds, one of these being arranged for use, when required, as a deep water ballast tank. By the adoption of the girder system of construction these holds are free of obstruction, and are capable of receiving the largest type of consignments. The vessel is propelled by a set of quadruple-expansion engines, carefully designed and balanced so as to reduce vibration. Steam is generated in four single-ended steel cylindrical multitubular boilers working under forced draught.

FOREIGN.

DELIVERANCE. Launch, May 7th. This vessel, a combined steam trawler and wrecking steamer, built to the order of the Southern Salvage Co. of Liverpool (N.S.), was launched at Bristol, Nova Scotia, on May 7th. Dimensions: Length, 118 ft.; breadth, 32 ft.; depth, 10 ft. 6 in. The vessel is fastened and bolted with galvanized iron, has plenty of deck room for wrecking and beam trawling purposes, and is designed for salvage work. She is equipped with powerful winches, derricks, steam pumps, air compressors, anchors and cables, and a deep-sea diving apparatus. The wireless equipment will have a range of 300 miles. The vessel has twin screws, and the engines will develop about 600 h.p.

IRON AND STEEL INSTITUTE.—The autumn meetings will be held in Paris on the 17th, 18th and 19th of September.

THE INSTITUTION OF CIVIL ENGINEERS.—The annual conversazione will be held at the Institution on July 2nd, from 8.30 to 11.30 o'clock.

COURT OF ENQUIRY.—"EMPRESS OF IRELAND."—The four assessors attached to the Court of Enquiry to investigate the loss of the *Empress of Ireland* are Prof. John Welch and Commander W. F. Caborne, C.B., R.N.R., appointed by His Majesty's Government. The Canadian Government have nominated Capt. L. A. Demers, Wreck Commissioner of Canada (nautical assessor) and Commander Howe, consulting engineer of the Department of Naval Affairs (engineer assessor). Mr. J. A. Webster, principal clerk in the Board of Trade, accompanied Lord Mersey, President of the Court.

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